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# New Species of Araceae from Bolivia and the Tropical Andes

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**ABSTRACT.** A total of 16 taxa (15 species and 1 variety) of Araceae are new to science. These include *Anthurium acebeyae* Croat, *A. beckii* Croat & Acebey, *A. besseae* Croat, *A. kunthii* Poeppig var. *cylindricum* Croat, *A. ottobuchtienii* Croat & Acebey, *A. stephanii* Croat & Acebey, *A. yungasense* Croat & Acebey, *Dieffenbachia williamsii* Croat, *Monstera kessleri* Croat, *Philodendron cotapatense* Croat & Acebey, *P. kroemeri* Croat, *Rhodospatha mukuntakia* Croat, *Stenospermation dictyoneurum* Croat & Acebey, *S. killipii* Croat & A. Gomez, *Xanthosoma puberulum* Croat, and *X. seidelii* Croat.

**RESUMEN.** Un total de 16 taxones (15 especies y 1 variedades) de Araceae son nuevas para la ciencia. Estas incluyen *Anthurium acebeyae* Croat, *A. beckii* Croat & Acebey, *A. besseae* Croat, *A. kunthii* Poeppig var. *cylindricum* Croat, *A. ottobuchtienii* Croat & Acebey, *A. stephanii* Croat & Acebey, *A. yungasense* Croat & Acebey, *Dieffenbachia williamsii* Croat, *Monstera kessleri* Croat, *Philodendron cotapatense* Croat & Acebey, *P. kroemeri* Croat, *Rhodospatha mukuntakia* Croat, *Stenospermation dictyoneurum* Croat & Acebey, *S. killipii* Croat & A. Gomez, *Xanthosoma puberulum* Croat, and *X. seidelii* Croat.

**Key words:** *Anthurium*, Araceae, Bolivia, *Dieffenbachia*, floristics, *Monstera*, *Philodendron*, *Rhodospatha*, *Stenospermation*, *Xanthosoma*.

In preparation of the Araceae treatment for the checklist of Bolivian plants being carried out at the Missouri Botanical Garden, we have discovered a number of taxa that are new to science. A complete treatment of the Araceae of Bolivia, including provisional descriptions of many species believed to be new but for which there is inadequate material to describe, will eventually be available on the the Missouri Botanical Garden web page: <http://www.mobot.org/MOBOT/Research/southamericaprojects.shtml/bolivia>. This will include a key to the species of *Dieffenbachia*, *Monstera*, and *Stenospermation* for

Bolivia as well as full descriptions and complete exsiccatae for species in other Araceae genera.

## ANTHURIUM

***Anthurium acebeyae*** Croat, sp. nov. TYPE: Bolivia. La Paz: Nor Yungas, 14.3 km NE of Chuspipata, 16°14'S, 67°47'W, 2000 m, 23 Mar. 1984, J. Solomon, B. Stein & M. Uehling 12090 (holotype, MO-3213306; isotypes, K, LPB, US). Figure 1.

Planta epiphytica; internodia 1–2 cm longa, 1.7 cm diam.; cataphylla 11–15 cm longa, persistentia semi-intacta; petiolus 30–54 cm longus, subteres; lamina triangulari-sagittata, 41–54.5 cm longa, 23–28 cm lata; lobuli postici 11–16.5 cm longi, 8–10 cm lati; nervis primariis lateralibus 8–10 utroque; pedunculus 23–39 cm longus; spatha viridis, 8.5–15 cm longa, 1.1–1.5 cm lata; spadix 7.5–22.5 cm longus, 4–9 mm diam., stipitatus 3–20 mm, viridis.

Epiphyte; internodes 1–2 cm long, 1.7 cm diam.; cataphylls 11–15 cm long, dark brown persisting semi-intact with apex remaining intact and pale fibers showing toward the base, sometimes forming an almost completely fibrous network. Petioles 30–54 cm long, about half as long as blades, subterete, narrowly, obtusely and shallowly sulcate, semiglossy, medium green, drying dark brown to blackened. Leaf blades triangular-sagittate, 41–54.5 × 23–28 cm, 1.7–2.2 times longer than wide, deeply lobed at base, acuminate at apex, subcoriaceous, medium to dark green and semiglossy above, slightly paler and glossier below, drying dark green to dark brown above, yellow-green to yellow-brown below; posterior lobes 11–16.5 × 8–10 cm, usually directed downward, sometimes somewhat outward; anterior lobes straight to broadly concave; basal veins 6 to 8, 1st pair free to base, 2nd pair sometimes free to base, 4th and higher order pairs coalesced 5–6 cm; posterior rib naked for 2.5–5.5 cm; midrib narrow, slightly paler and bluntly acute above, paler and narrowly round-raised below, drying concolorous or slightly darker than surface, sometimes acute



Figure 1. A–D. *Anthurium acebeyae* Croat (Croat et al. 84274). —A. Habit. —B. Leaf blade adaxial surface. —C. Close-up of inflorescence. —D. Stem with cataphylls and petiole bases.

above, darker or lighter than surface below; *primary lateral veins* 8 to 10 pairs, arising at 30°–50° angle to midrib, weakly quilted-sunken and concolorous above, narrowly raised and slightly paler below; tertiary veins mostly not raised, drying darker than surface. INFLORESCENCE erect; *peduncle* 23–39 cm long; *spathe* green, 8.5–15 × 1.1–1.5 cm, reflexed-spreading; *spadix* 7.5–22.5 cm × 4–9 mm, stipitate for 3–20 mm, medium to dark green, semiglossy. Flowers 1.8–2.2 mm long, 7 to 9 visible per spiral; lateral tepals 0.9–1.0 mm wide, inner margin rounded, outer margin 2-sided; anthers 0.4 × 0.6 mm; pollen white.

*Distribution and habitat.* *Anthurium acebeyae* is endemic to Bolivia in La Paz (Nor Yungas, Sur Yungas, Caranavi) and Cochabamba (Carrasco) Departments at 1500–2300 m elevation in a *Premontane moist forest* (P-mf) life zone (Holdridge et al., 1971). The new species is a member of section *Belolochium* Schott emend. Engler, and is characterized by its epiphytic habit, short internodes, persistent, semi-intact cataphylls, triangular-sagittate leaf blades with the margins usually concave, and the long-pedunculate inflorescence with a stipitate green spadix.

*Anthurium acebeyae* is most likely to be confused with the widespread and variable *A. incurvatum* Engler, which also occurs in the highlands of Bolivia, but it is distinguished from that species by its concave blade margins and green inflorescences (the spathe with conspicuously convex blade margins and the spadix purple to violet-purple in *A. incurvatum*). The new species can also be confused with *A. yungasense* Croat, which shares similar persistent cataphylls and stipitate green spadices, but differs in having semiglossy to glossy blades that are convex along the margins of the anterior lobes. In addition, the spadix of *A. acebeyae* is usually much more conspicuously stipitate (frequently by 1–2 cm).

The species is named in honor of Amparo Acebey, Bolivian aroid specialist and coauthor of this paper, who assisted in collecting the type specimen.

*Paratypes.* BOLIVIA. **Cochabamba:** Carrasco, Cochabamba–Villa Tunari, km 141 on old rd., Kessler et al. 7730 (LPB, MO). **La Paz:** Caranavi, Serranía Bella Vista, 37 km from Caranavi on the rd. to Sapecho, Kessler et al. 11345 (LPB, MO); Nor Yungas, Caranavi–Yucumo, 37.6 km NE of Caranavi, T. B. Croat et al. 84274 (B, COL, LPB, MO, NY, USM); NE of La Paz, 5.4 W of rd. to Coroico, Croat 51459 (LPB, MO); 16.5 km NE of Chuspipata, 13.6 km SW of Yolosa, J. Solomon & Uehling 12166 (LPB, MO); Cotapata NP, T. Kroemer & Acebey 979 (LPB); Est. Biol. Tunquini, senda del pajonal, atrás del Río Cedroni, K. Bach et al. 970 (LPB); Bajo Hornuni, trail to the camp of Don Pedro, trail to the mine, D. Quintana

et al. 5 (LPB, MO), Bach et al. 970 (LPB, MO), García et al. 4391 (LPB, MO), 4431 (LPB, MO); Sud Yungas, Huanacané, 6.5 km S, on new rd., S. Beck 3058 (LPB, MO).

***Anthurium beckii*** Croat & Acebey, sp. nov.

TYPE: Bolivia. La Paz: Abel Iturralde, Tumupasa-San José de Uchupiamonas, NW of Tumupasa along slope leading up to Madidi NP, 5.5–5.8 km above jct. in main rd. near Tumupasa, 15°45'N, 67°50'W, 830–850 m, 9 Aug. 2000, T. B. Croat, A. Acebey & T. Kroemer 84387 (holotype, MO-5187101; isotypes, K, LPB, NY, US). Figure 2A.

Planta epiphytica; internodia brevia, 1 cm diam.; cataphylla 3.5 cm longa, semi-intacta, persistentia, fibris inferne; petiolus teres, 5–15 cm longus, 1.5 mm diam.; lamina oblongo-lanceolata, 25–36 cm longa, 1.2–4.5 cm lata; nervis primariis lateralibus 5–7 utroque; pedunculus (13)26–36.5 cm longus, 1.5–2.5 mm diam.; spatha lanceolata, 4.3–5.5 cm longa, 5–7 mm lata, ex purpureo viridis; spadix atropurpureus, 7–10.5 cm longus.

Epiphyte; internodes short, 1 cm diam.; cataphylls 3.5 cm long, semi-intact, the fibers parallel, promptly becoming fibrous with paler brown fibers. Petioles terete, 5–15 cm long, 1.5 mm diam. on drying, medium green, weakly glossy, drying light yellow-brown. Leaf blades oblong-lanceolate, sometimes weakly falcate, 25–36 × 1.2–4.5 cm, 9–11 times longer than wide, coriaceous, matte, acute to very narrowly rounded at the base, narrowly acuminate at apex, moderately bicolorous, dark green above, moderately paler below, drying dark olive-green to dark yellow-brown above, moderately paler and yellow-brown below; midrib narrowly raised and ± concolorous above, bluntly raised and paler below; primary lateral veins 5 to 7 pairs, scarcely visible on fresh leaves, arising at 15°–20° angle from midrib, drying flat to deeply sunken above, scarcely visible on lower surface; collective veins arising from the base, drying weakly raised and conspicuously more prominent than primary lateral veins on lower surface, flattened to sunken on upper surface; tertiary veins obscure. INFLORESCENCE erect; peduncle (13)26–36.5 cm long, 1.5–2.5 mm diam., terete, tinged purple; spathe spreading, lanceolate, 4.3–5.5 cm long, 5–7 mm wide, green, tinged purple to violet-purple, matte; spadix dark violet-purple, matte, 7–10.5 cm long. Flowers 3 or 4 per spiral, 2.4–2.6 × 1.8–2.2 mm; lateral tepals 1.6–1.8 mm wide, the inner margin very broadly rounded, outer margin 2-sided; pollen pale orange. Berries orange, subglobose, 6 mm long, 4–5 mm diam.

*Distribution and habitat.* *Anthurium beckii* is endemic to Bolivia, where it is known only from the

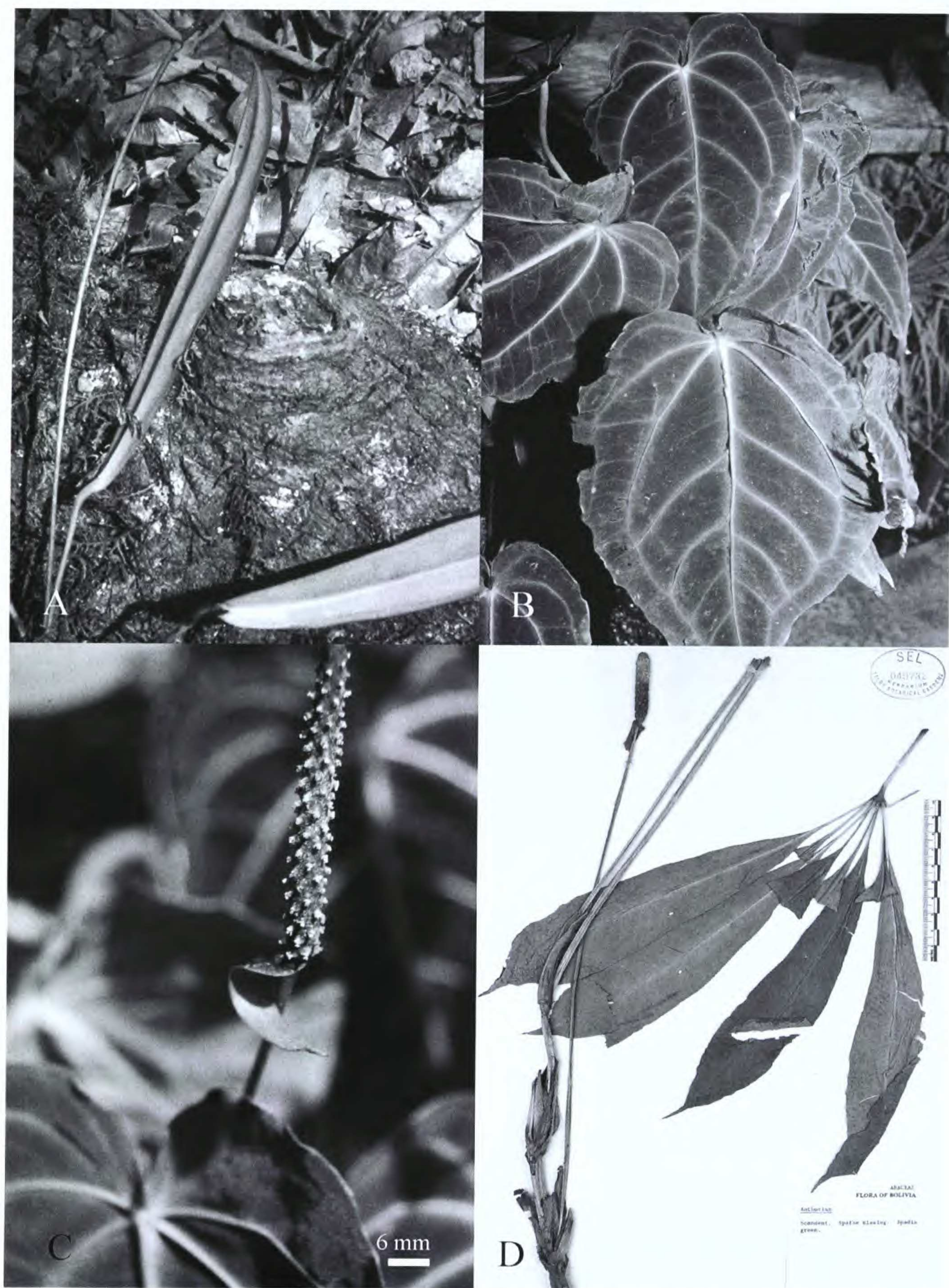


Figure 2. —A. *Anthurium beckii* Croat & Acebey (Croat *et al.* 84387). Habit. B, C. *Anthurium besseae* Croat (Croat 71836). —B. Habit. —C. Close-up of leaf and inflorescence. —D. *Anthurium kunthii* var. *cylindricum* Croat (Besse *et al.* 1790). Herbarium specimen.

mountains of northeastern La Paz Department in the provinces of Abel Iturralde, J. Bautista Saavedra, Franz Tamayo, Sud Yungas, and Caranavi at 600–1550 m.

The new species is a member of section *Porphyrochitonium* Schott and is superficially close to *Anthurium friedrichsthalii* Schott, which ranges from Costa Rica to western Colombia, but is not found in the Amazon basin. The latter species differs in being a pendent epiphyte with proportionately longer leaves (to 14–16 times longer than wide) with the upper blade surface epunctate and in having a spadix that is green at anthesis (turning brownish in age). In contrast, *A. beckii* is a more or less erect herb, with leaf blades no more than 11 times longer than wide and glandular-punctate on both surfaces, and has a spadix that is dark purple at anthesis.

*Paratypes.* BOLIVIA. **La Paz:** Caranavi, Serranía Bella Vista, Caranavi–Sapecho, km 47, *P. Kessler et al.* 11664 (LPB, MO); Saavedra, Pauji–Yuyo, km 3, Apolo–Charazani, *Kessler et al.* 9732 (LPB, MO); Sud Yungas, Alto Beni, Sapecho, Colonia 16 de Julio, subiendo la senda hacia la antena de ENTEL, *Kroemer & Acebey* 711 (LPB, MO); Tamayo, Apolo–Charazani, km 52, bey. Correo, Campamento Calabatea, *S. Beck & R. Foster* 18577 (LPB); Campamento Alto Limón, Limón–Mara, trail San José–Apolo, *Helme* 556 (LPB, MO).

***Anthurium besseae*** Croat, sp. nov. TYPE: Bolivia. Cochabamba: Chapare, old rd. from Cochabamba to Villa Tunari, vic. Villa Tunari, 240 m, cultivated at Selby Botanical Gardens (originally collected live by *Libby Besse*, 25 Jan. 1986), 29 Sep. 1996, *T. B. Croat* 79380 (holotype, MO-3301223; isotypes, B, K, LPB, NY, SEL, US). Figure 2B, C.

Planta terrestris; caudex fasciculatus, brevis; cataphylla ad 5.5 cm longa, persistentia intacta versus apicem, fibris inferne; petiolus plus minusve teres, (10)19–33 cm longus; lamina ovato-cordata vel anguste ovato-cordata, 13–33 cm longa, 8–23 cm lata; nervis primariis lateralibus 2–4 utroque; pedunculus (4)9–25(36.5) cm longus; spathe 1.3–5.5 cm longa, 2–8 mm lata, viridis; spadix 1.2–7.3 cm longus, 5–7 mm diam., atropurpureus.

Terrestrial; stems densely clustered and short; internodes short, ca. 1–2.5 cm diam.; cataphylls to 5.5 cm long, drying dark brown, persisting semi-intact in part, the remainder fibrous. Petioles (10)19–33 cm long, erect-spreading,  $\pm$  terete, green, tinged red with white spots in lower half, matte; geniculum 2.5 cm long, 3.5 mm diam. LEAVES semi-erect with the blades  $\pm$  pendent from semi-erect petioles. Leaf blades ovate-cordate to narrowly ovate-cordate, 13–33  $\times$  8–23 cm, subcoriaceous, deeply cordate at base, acuminate at apex, medium dark green and velvety above, much

paler to moderately paler and matte below, drying matte on both surfaces, undulate to crenulate along the margins; anterior lobe 13–26 cm long, the margins broadly rounded; posterior lobes 3.5–8.5 cm long, rounded; midrib and basal veins convex to sharply raised to knife-edged and paler above, marginally somewhat paler along the major veins above, drying paler than surface both above and below; midrib almost flat and paler to darker below; primary lateral veins 2 to 4 pairs, arising at 55°–65° angle, weakly raised to convex and much paler than surface above, weakly raised and darker below; tertiary veins weakly visible below, drying undulate; basal veins 3(4) pairs, all free to the base, weakly raised above, weakly raised and green below; sinus narrowly V-shaped to oblong or closed, 3–5 cm deep, to 8 mm diam. INFLORESCENCE erect-spreading, usually held somewhat above leaves; peduncle (4)9–25(36.5) cm long, 2–3 mm diam., maroon to weakly purplish-spotted; spathe 1.3–5.5 cm long, 2–8 mm wide, medium green, tinged maroon to purple on inner surface, minutely warty, initially erect, becoming reflexed and recurved post-anthesis; spadix 1.2–7.3 cm long, 5–7 mm diam., curved forward, dark purple to purplish violet, cylindroid to slightly tapered; tepals matte. Flowers 2–2.2 mm wide and long, 5 per spiral; sides straight, parallel to spiral; tepals matte, lateral tepals 1.3–1.6 mm wide, weakly pale-punctate; inner margins rounded; stamens weakly exerted at anthesis, closely aggregated; pollen orange; pistils purple, sometimes exerted. Berries not seen.

*Distribution and habitat.* *Anthurium besseae* is endemic to the type locality in Bolivia in the Department of Cochabamba, Province of Chapare, at 240 m.

The new species is a member of *Anthurium* sect. *Cardiolonchium* Schott and is distinguished by its short stem, short internodes, subterete petioles, and ovate-cordate, velvety blades with a narrow sinus or with the posterior lobes actually overlapping and with the major veins raised and much paler on the upper surface. Also characteristic is the purple spadix with slightly exerted stamens. It is superficially similar to *A. regale* Linden, from central Peru, in having velvety leaves with pale veins on the upper surface. That species typically has blades many times longer, ranging from 35 cm to about 100 cm long. *Anthurium regale* also differs in having the basal veins mostly fused into a posterior rib rather than free to the base as in *A. besseae*. In addition, *A. regale* has a creamy white rather than dark purple spadix.

The species is named in honor of Libby Besse,

long-time benefactor, Board member, and volunteer staff member of the Marie Selby Botanical Gardens in Sarasota, Florida, who sponsored many expeditions to Latin America, especially in Ecuador, and collected the live plant from which the type specimens were prepared.

*Paratypes.* BOLIVIA. **Cochabamba:** Chapare, along old rd. from Cochabamba to Villa Tunari, vic. Villa Tunari, *Christenson 1134* (SEL), *Ingram 972* (MO, SEL), *Ingram & Atwood 1029* (MO, SEL), *Croat 71836* (MO). All paratypes made from cultivated plant at Selby Botanical Gardens 82–85, originally collected as *Libby Besse et al.*

***Anthurium kunthii*** Poeppig, Nov. Gen. Sp. Pl. 3: 84–85. 1845. TYPE: Peru. Loreto: Maynas, *Poeppig s.n.* (holotype, W destroyed).

***Anthurium kunthii*** Poeppig var. ***cylindricum*** Croat, var. nov. TYPE: Bolivia. La Paz: Larecaja, Caranavi–Tipuani, km 60, 550 m, 24–26 Jan. 1983, *L. Besse, C. & J. Luer & R. Vásquez 1790* (holotype, SEL-04732). Figure 2D.

Ab *Anthurio kunthii* var. *kunthii* spadice clavato, lamina oblanceolata angustius et nervis primariis lateralibus debilibus differt.

Hemiepiphytic climber; *internodes* 6–9 cm long, 1 cm diam., drying moderately smooth, pale yellow-brown; *cataphylls* narrowly triangular, pale yellow-brown, persisting  $\pm$  intact at upper nodes. *Petioles* subterete, 49 cm long, drying to ca. 3 mm diam., pale yellow-green. Leaf *blades* narrowly oblanceolate, 24–27.5  $\times$  4.2–4.5 cm, gradually long-acuminate at apex, attenuate at base, drying dark yellowish brown and matte above, moderately paler, medium yellowish gray-brown and weakly glossy below; *midrib* drying narrowly raised to acute and concolorous above, thicker than broad and slightly paler than surface below, the midrib often with a weak medial sulcus; *petiolules* 2.5–3.5 cm long, ca. 1.5 mm diam.; *primary lateral veins* arising at 55°–65° angle, not apparent on upper surface, sometimes visible below, ca. 6 pairs, generally scarcely more apparent than interprimary veins. INFLORESCENCE erect; *peduncle* 32 cm long, drying 2.5 mm diam.; *spathe* green, 4 cm  $\times$  7 mm; *spadix* green, weakly clavate, 4.5 cm long, 8 mm diam. on drying, rounded at apex. Flowers 3.0–3.2 mm wide and long, 5 to 6 visible per spiral; lateral tepals 1.8 mm wide, the inner margin very broadly rounded, outer margin 2-sided.

*Distribution and habitat.* *Anthurium kunthii* var. *cylindricum* is endemic to Bolivia, where it is known only from the type locality in La Paz Department, Province of Larecaja.

The new variety differs from the typical variety

in having blades that are more narrowly oblanceolate (vs. usually more nearly elliptic), with obscure or very weak primary lateral veins (vs. typically moderately obvious), and a clavate spadix (vs. longer and narrowly tapered).

***Anthurium ottobuchtienii*** Croat & Acebey, sp. nov. TYPE: Bolivia. La Paz: Murillo, 44 km below Lago Zongo dam, vic. of Cahua hydroelectric plant, 16°03'S, 68°01'W, 1200 m, 12–15 Sep. 1983, *J. Solomon 10749* (holotype, MO-3158417; isotypes, B, K, LPB, NY, US, USM). Figure 3A, B.

Planta terrestris; *cataphylla* (5.5)10–13.5 cm longa, pro parte maxima decidua; *petiolus* (11)14–28 cm longus, subteres; *lamina* (12)17–44 cm longa, (3)4–8.0 cm lata, plerumque oblongo-lanceolata vel anguste oblongo-oblanceolata; *nervis primariis lateralibus* 10–14 utroque; *pedunculus* (6)17–25 cm longus; *spatha lanceolata*, (2.3)5.5–6.5 cm longa, 7–10 mm lata; *spadix atroviolaceo-atropurpureus*, (3)4.5–8 cm longus.

Terrestrial on steep bank; stem 30–100 cm long; *internodes* (0.5)1.0–1.5(2.5)  $\times$  1.0–1.8 cm, medium green and weakly glossy, soon gray-green to gray-brown, semiglossy, often longitudinally and narrowly ribbed, sometimes transversely cracked; *cataphylls* (5.5)10–13.5 cm long, medium green, soon dead except parts of base and thin pale fibers at upper nodes, sometimes turning brown and persisting intact at upper nodes, finally weathering to pale fibers with fragments of epidermis of the base of the cataphylls, finally completely deciduous. *Petioles* (11)14–28 cm long, drying 1–2 mm wide, subterete, oval, narrowly and sharply to obtusely flattened, sometimes weakly flattened, sometimes weakly and narrowly sulcate to deeply sulcate, sometimes sharply flattened with weak medial rib, medium green, weakly glossy. Leaf *blades* (12)17–44  $\times$  (3)4–8.0 cm, (2.7)3.4–8 times longer than wide, oblong-lanceolate to narrowly oblong-oblanceolate, sometimes ovate-elliptic to narrowly elliptic, 1.3–2.5 times longer than petioles, narrowly acuminate at apex, abruptly acute to obtuse at base (sometimes inequilateral), subcoriaceous, semiglossy, slightly bicolorous, medium to dark green above, moderately paler below, drying dark green to dark reddish brown to yellow-brown above, moderately paler and yellow-green to reddish brown below; *midrib* acute to narrowly raised and concolorous above, often in deep valleys above, narrowly raised and slightly paler below, drying acute and concolorous above, paler than surface, round-raised and brown to reddish brown, sometimes finely costate below; *primary lateral veins* 10 to 14 pairs, arising at 40°–60°(70°) angle, weakly quilted-sunk-



Figure 3. A, B. *Anthurium ottobuchtienii* Croat & Acebey (Croat et al. 84733). —A. Habit. —B. Close-up showing inflorescence at anthesis and young infructescence. —C. *Anthurium stephanii* Croat & Acebey (Beck 3109). Herbarium specimen. —D. *Anthurium yungasense* Croat & Acebey (Croat et al. 84264). Habit.

en and concolorous above, usually about as prominent as the collective veins above, narrowly raised and concolorous below, scarcely more prominent than the interprimary veins; collective veins arising from one of the lowermost primary lateral veins (sometimes from near the middle of the blade), or from the 1st basal veins, 1–7 mm from margin, loop-connecting the primary lateral veins. INFLORESCENCE erect to semi-erect; *peduncle* (6)17–25 cm long, less than 3 mm diam. on drying; *spathe* lanceolate, spreading, (2.3)5.5–6.5 cm × 7–10 mm, light to medium green, margin purple; *spadix* (3)4.5–8 cm long, dark purple-violet, erect to slightly curved, matte. Flowers ca. 3 visible per spiral, 2.5–4 mm long; lateral tepals shield-shaped, 1.6–2.4 mm wide, the inner margin broadly rounded, the outer margins 2-sided; pistils early-emergent. INFRUCTESCENCE to 14 cm long, nodding; *berries* subglobose, ca. 4 mm diam., dark violet-purple.

*Distribution and habitat.* *Anthurium ottobuchtienii* is endemic to Bolivia in the departments of La Paz (Nor Yungas, Sud Yungas, Caranavi, and Murillo) and Cochabamba (Prov. Carrasco), at 1100–2650 m.

The new species is a member of section *Xialophyllum* Schott, and is characterized by its generally terrestrial habit; cataphylls persistent, intact only at upper nodes; frequently long, narrow leaf blades; and purple-violet spadix. It is also characterized by having blades that dry dark green with the primary lateral veins and the collective veins deeply sunken in “valleys” on drying. The species tends to have proportionately broader leaf blades at higher elevations (2400–2650 m).

The new species is perhaps most easily confused with *A. mindense* Sodiro, of Ecuador and northern Peru, but the latter differs in having longer and proportionately more slender internodes and generally proportionately broader leaf blades. *Anthurium ottobuchtienii* is also similar to *A. microspadix* Schott, but that species has proportionately wider blades (less than 6 times longer than wide) that dry green rather than brown and has a green rather than purple spadix.

A few collections have leaf blades that are shorter than normal, ranging between 2.9 and 3.5 times longer than wide. These also appear to belong here, but they are at the extreme in terms of size and shape and differ from typical *A. ottobuchtienii* in the color and venation of the dried leaf blades.

The species is named in honor of Otto Buchtien, a German who made many collections in Bolivia

during the early 20th century and who made the first collection of the species.

*Paratypes.* BOLIVIA. Prov. Unknown: Cordillera Real, Nequejahuira, *I. Tate* 633 (MO, NY). **Cochabamba:** Carrasco, Cochabamba–Villa Tunari on old rd., km 118, *Kessler et al.* 7100 (LPB, MO), km 130, *B. Kessler et al.* 7153 (LPB, MO). **La Paz:** Murillo, Valle de Zongo, *T. B. Croat* 51426 (LPB, MO); 32.8 km beyond the summit, 300 m S of Planta Hidroeléctrica Chururaqui, *Solomon et al.* 19062 (LPB, MO); 30.5 km N [below] dam at Lago Zongo, trail up Río Jachcha Cruz, *J. Solomon* 9098 (LPB, MO); 44 kms después del abra de Zongo, *S. Beck* 7245 (LPB); Nor Yungas, Polo-polo hacia Coroico, *O. Buchtien* 3667 (NY, US); 9.5 km NE below Chuspipata, 20.2 km S of Yolosa, *Solomon* 8103 (COL, LPB, MO); Serranía de Bella Vista, 16 km N of Carrasco, 37 km N of Caranavi on rd. to Palos Blancos, *Solomon & Nee* 12716 (MO); Unduavi–Caranavi, 34.8 km E of Unduavi, 16.3 km SW of Yolosa, *Croat* 51575 (MO); Cotapata NP, Est. Biol., Tunquini, vic. of Chairó, NW of Coroico, 23 km W of Yolosa, *Croat et al.* 84754 (LPB, MO, W); Senda del Pajonal, *Bach* 973 (LPB, MO), *E. Garcia et al.* 4434 (LPB, MO); trail to Campo de Don Pedro, trail to the mine, *Bach* 443 (LPB, MO); trail to Hornundi, *Palabral et al.* 4 (LPB), *Palabral et al.* 46 (LPB); Sacramento, Chuspipata–Yolosa, *A. Gentry & Solomon* 52045 (F, GH, LPB, MO); 8 km de Chuspipata hacia Coroico, *M. Kessler et al.* 12049 (LPB, MO); Serranía Bella Vista, Rurrenabaque–Caranavi, 28.4 km SW of middle of bridge over Río Beni near Sapecho, 21.4 km SW of Río Piquendo, *Croat et al.* 84733 (LPB, MO); Caranavi hacia Sapecho, km 37, *Kessler et al.* 11349 (LBP, MO); Hacienda Simaco sobre el camino a Tipuani, *Buchtien* 5345 (GH, NY); Casaniacamino a Tipuani, *Buchtien* 7172 (US).

***Anthurium stephanii* Croat & Acebey, sp. nov.**

TYPE: Bolivia. La Paz: Nor Yungas, Est. Biol. Tunquini, 16°12'S, 67°51'W, 1700 m, 3 Apr. 2000, *T. Kroemer & A. Acebey* 994 (holotype, MO-5650250; isotypes, B, F, K, LPB, NY, US, USM, VEN). Figure 3C.

Planta hemiepiphytica; internodia brevia, minus quam 1 cm in sicco; cataphylla 5–10 cm longa, persistentia; petiolus teres, 16.5–24 cm longus; lamina oblongo-lanceolata vel oblanceolata, 28–38.5 cm longa, 7.2–9.1 cm lata; nervis primariis lateralibus 13–15 utroque; pedunculus 20 cm longus; spatha lanceolata, viridis, 7.5–12 cm longa, 9–12 mm lata, spadix 10.3–12 cm longus, 3 mm diam. in sicco, stipitatus 6 mm.

Hemiepiphytic vine; *internodes* very short near the apex, drying less than 1 cm diam., dark reddish brown; *cataphylls* 5–10 cm long, slender, persistent along with the petiole bases. *Petioles* terete, 16.5–24 cm long, sheathed 35%–40% their length, drying dark yellow-brown; *geniculum* 1.5–2.0 cm long, darker, terete. Leaf blades oblong-lanceolate to oblanceolate, 28–38.5 × 7.2–9.1 cm wide, 3.8–4.6 times longer than wide, broadest at middle or above middle, narrowly acuminate at apex, acute at base, semiglossy on both surfaces, dark green above,



slightly paler below, drying medium to dark green above, reddish brown to yellow-brown above, narrowly raised and concolorous to weakly paler above, drying  $\pm$  acute toward the middle of the blade above, narrowly convex and darker than surface below; *primary lateral veins* 13 to 15 pairs, weak and scarcely visible on both surfaces; collective veins arising from the base, 7–10 mm from margin, scarcely raised and concolorous on upper surface, weakly raised on lower surface, weakly loop-connecting the primary lateral veins; tertiary veins obscure. INFLORESCENCE erect-spreading; *peduncle* 20 cm long, drying 2 mm diam.; *spathe* lanceolate, green, 7.5–12  $\times$  9–12 mm; *spadix* 10.3–12 cm long, drying 3 mm diam., stipitate 6 mm. Flowers 2.3–3.7 mm long, 3 flowers visible per spiral; lateral tepals 1.7 mm wide, inner margin rounded, outer margin 2-sided. *Berries* unknown.

*Distribution and habitat.* *Anthurium stephanii* is endemic to Bolivia in La Paz Department at 1900–2400 m elevation.

The new species is an unusual member of *Anthurium* sect. *Calomystrium* Croat, characterized by its slender stems, persistent, lanceolate, intact cataphylls, and lanceolate dark-brown-drying blades.

This species is different from its close congeners because there are no other species of section *Calomystrium* with lanceolate leaf blades.

The species is named in honor of Stephan G. Beck, noted German botanist who has spent most of his professional career, from the 1980s to the present, in Bolivia.

*Paratypes.* BOLIVIA. **La Paz:** Franz Tamayo, Madidi NP, Piñalito, 30 km E of Apolo on trail to San José de Uchupiamonas, *Fuentes et al.* 4688 (LPB, MO, US); Nor Yungas, Est. Biol. Tunquini, trail to Campo Don Pedro, *E. García et al.* 4388 (LPB, MO), *Bach et al.* 968 (LPB, MO), *Quintana et al.* 8 (LPB, MO); Sud Yungas, Huancané, 7.5 km to the S over a new rd., *S. G. Beck* 3109 (LPB).

***Anthurium yungasense*** Croat & Acebey, sp. nov.

TYPE: Bolivia. La Paz: Nor Yungas, Anmi Cotapata NP, Est. Biol. Tunquini, NW of Coroico, NNE of La Paz, vic. of El Chairó, 23 km W of Yolosa, 16°12'S, 67°50'W, 1300–1500 m, 21 Aug. 2000, *T. B. Croat, A. Acebey & T. Kroemer* 84782 (holotype, MO-5185105; isotypes, B, COL, GOET, K, LPB, NY, QCNE, UB, US, USM, VEN). Figures 3D, 4A.

Planta terrestris; cataphylla 10–16 cm longa, plerumque intacta; petiolus 51–56 cm longus, subteres, leniter complanatus; lamina anguste ovata, 49–60(65) cm longa, 23–29(35) cm lata, profunde sagittata; lobi postici (11)13–16(18) cm longi, (8)10–10.5(12.5) cm lati; nervis basalibus 7–10 utroque; nervis lateralibus 4–6(7) utroque;

pedunculus 32–38 cm longus; spatha 6.5–13 cm longa, 8–15 mm diam.; spadix atroviridis vel olivaceus, stipitatus 4–6 mm, 6.5–13.5 cm longus, 12 mm diam.

Terrestrial to ca. 1 m tall; *internodes* short or longer than broad, 1–6  $\times$  (1.5)2.0–2.7(4.5) cm, gray-green and  $\pm$  scurfy; *cataphylls* 10–16 cm long, turning brown, intact or often merely as pale fibers toward the base of the cataphylls at upper nodes, these thin and appressed to the stem. *Petioles* 51–56 cm long, subterete to oval in cross section, obtusely flattened adaxially, medium green, semiglossy, unmarked or sometimes short-lineate; geniculum 2.5 cm  $\times$  7 mm, slightly thicker than petioles. *Leaf blades* narrowly ovate, 49–60(65) cm long, 23–29(35) cm wide, 1.7–2.1 times longer than wide, 1.0–1.2 times longer than petioles, subcoriaceous, dark green and matte-subvelvety, sometimes faintly pale-speckled above, slightly to moderately paler and matte below, drying matte, gray-green above, moderately paler and yellowish green below, deeply sagittate-lobed at base, briefly short-acuminate at apex; posterior lobes (11)13–16(18) cm long, (8)10–10.5(12.5) cm wide, directed downward and curved inward; anterior lobes (21)40–42(65) cm long, usually broadly rounded along margins, sometimes almost straight, rarely weakly concave; sinus hippocrepiform to obovate (sometimes closed), 10–12(16) cm deep, 3–5.5(8) cm wide; basal veins 7 to 10 pairs, 1st pair free to the base, 2nd pair almost free, 5th and higher order pairs coalesced 5–5.5 cm; posterior rib naked 2–4.5 cm along the sinus; *midrib* acutely triangular to narrowly convex (more acute toward the apex), and slightly paler to concolorous, slightly paler to moderately paler and densely pale-speckled above, narrowly rounded to bluntly acute and paler to moderately paler below, drying yellow-brown to dark brown below; *primary lateral veins* 4 to 6(7) pairs, scarcely more conspicuous than the interprimary veins, arising at 40°–65° angle, narrowly raised and bluntly acute, slightly paler to concolorous above, narrowly raised and acute to bluntly acute, slightly paler below, usually drying yellow-brown and darker than surface or yellowish and paler than surface below, arching prominently upward along the margin but often not forming a collective vein throughout most of the length of the blade; often with the lowermost pair of lateral veins smaller than primary laterals, forming well above the petiole and spreading at a broad angle to merge with the uppermost (1st) basal vein; collective veins lacking or arising from one of the uppermost primary lateral veins. INFLORESCENCE erect; *peduncles* 32–38 cm long (to 49 cm long in fruit), terete, semiglossy, medium to dark green; *spathe* 6.5–13 cm  $\times$  8–15 mm, reflexed-spreading,



Figure 4. —A. *Anthurium yungasense* Croat & Acebey (Croat & Acebey 84264). Close-up of inflorescence. —B. *Dieffenbachia williamsii* Croat (Croat et al. 84385). Side view of whole plant showing stem, leaf, and inflorescence. C, D. *Monstera kessleri* Croat (Kessler 8479). —C. Type specimen with adult leaves, sheet 1. —D. Type specimen with pre-adult leaves, sheet 2.

under-rolled and sharply folded under twice, caudate-acuminate at apex, the margins rolled under; *spadix* dark green to olive-green, matte, stipitate 4–6 mm (6 mm diam.), 6.5–13.5 cm long, 12 mm diam. at base, 11 mm diam. midway, 8 mm diam. 1 cm from apex (drying 4–6 mm diam.). Flowers 1.9–2.0 mm long, 2.0–2.2 mm wide, 7 to 9 visible per spiral; tepals 1–1.6 mm wide, broadly rounded to almost straight on the inner margin, 2-sided on inside margin; stamens 0.4 mm long, 0.5 mm wide; pollen pale yellow. INFRUCTESCENCE to 16–36 cm long, 2 cm diam.; *berries* purple toward apex, white below middle.

*Distribution and habitat.* *Anthurium yungasense* is endemic to Bolivia, where it is known principally from Nor and Sud Yungas (hence the name). It is also known from the provinces of Caranavi, Murillo, Muñecas, and Saavedra in La Paz Department and Chapare Province in Cochabamba Department, at 1200–1700 m elevation.

The new species is characterized by its longer than wide internodes, cataphylls persistent intact or fibrous, subterete petioles, and narrowly ovate, matte-subvelvety, usually grayish-drying leaf blades with mostly free-ending primary lateral veins. Also characteristic is the stipitate, green spadix.

The new species is a member of *Anthurium* sect. *Cardiolonchium* Schott and is most easily confused with *A. incurvatum*, which has leaf blades of similar size and shape and a stipitate spadix. The latter species differs in having proportionally shorter and broader internodes, blades that are semiglossy, not matte-subvelvety above, typically drying yellow-green, and flowering spadices that are purple to purple-violet, not green. Though dried specimens of the two species are more difficult to separate, careful observation at high magnification shows the upper leaf blade surface of *A. incurvatum* appearing minutely granular, whereas that of *A. yungasense* is alveolate with the center of each epidermal cell usually sunken.

*Paratypes.* BOLIVIA. **Cochabamba:** Chapare, Cochabamba–Villa Tunari, *Croat 51258* (LPB, MO); vic. Hotel Caballeros, km 94, *Croat 51368* (LPB, MO). **La Paz:** Caranavi, Serranía Bella Vista, Caranavi–Sapecho, 44 km from Caranavi, *Kessler et al. 11580* (LPB, MO); Cultural Unidos, 36 km de Caranavi hacia Sapecho, *Kessler et al. 11684* (LPB, MO); Murillo, Valle de Zongo, 13.2 km above the Kahua Power Plant, *Croat 51444* (LPB, MO); 45.5 km below the dam at Lago Zongo, vic. of Cahua hydroelectric plant, *Solomon 12955* (MO); Muñecas, Río San Cristóbal near Consata, *Besse et al. 592* (SEL); Nor Yungas, *Bach et al. 1174* (LPB, MO); Cotapata NP, *Kroemer & Acebey 980* (LPB, MO); 4.6 km below Yolosa, then 19.1 km on rd. up Río Huarinilla, *Solomon 8803* (LPB, MO); 8.7 km

below Chuspipata on rd. to Yolosa, *Solomon 9308* (LPB, MO); 13.7 km on rd. up Río Huarinilla, *Solomon 9417* (LPB, MO); Coroico–Yolosa, 10 km up Río San Juan, *Beck 7553* (LPB, MO); Serranía Bella Vista, Caranavi–Yucumo, 34.3 km NE of Caranavi, *Croat et al. 84264* (LPB, MO); Unduavi–Caranavi, 34.8 km E of Unduavi, 16.3 km SW of Yolosa, *Croat 51572* (LPB, MO); Sur Yungas, *Beck 24880* (LPB, MO); 7–9.5 km NE of (above) Huancané, *Luteyn & Dorr 13741* (NY), *Beck 3056* (LPB, MO), *Beck 3123* (LPB, MO); Saavedra, Charazani–Apolo, km 15, *Kessler et al. 10459* (LPB, MO); Cerro Asunta Pata, entre Apolo y Charazani, *Kessler et al. 10204* (LPB, MO).

#### DIEFFENBACHIA

**Dieffenbachia williamsii** Croat, sp. nov. TYPE: Bolivia. La Paz: Abel Iturralde, Tumupasa–San José Uchupiamonas, NW of Tumupasa, along slope leading up to Madidi NP, 5.5–5.8 km above jct. to San José near Tumupasa, 15°45'S, 67°50'W, 830–850 m, 9 Aug. 2000, *T. B. Croat, A. Acebey & T. Kroemer 84385* (holotype, MO-5187105; isotypes, B, K, LPB, MO, US). Figure 4B.

Planta 30–90 cm alta; internodia 2–3 cm longa, 1.5–1.7 cm diam.; petiolus 11–17 cm longus; lamina ovata vel ovato-elliptica, 12–20(26) cm longa, 4.5–10(13) cm lata; nervis primariis lateralibus 7–11 utroque; pedunculus 4–6.5 cm longus, 6 × 4.5 mm latus; spatha 11–16 cm longa, 1–1.7 cm lata; spadix 9.5–11.5 cm longus; pars feminea 5.8–7 cm longa, pars masculina contingens.

Small herb, 30–90 cm tall; *internodes* 2–3 cm long, 1.5–1.7 cm diam., semiglossy to weakly glossy, drying matte, usually yellowish green, sometimes medium to dark orange-brown. *Petioles* 11–17 cm long, sheathed 0.3–0.6 their length, medium green, semiglossy, smooth, drying matte, medium yellow-green; sheath acute to narrowly rounded at apex; free part sharply and broadly sulcate, drying narrowly sulcate. *Leaf blades* narrowly ovate to ovate-elliptic, 12–20(26) × 4.5–10(13) cm, (1.6)2.0–3.0(3.6) times longer than wide, 1.2 times longer than petioles, weakly inequilateral, one side 5–13 mm wider, inequilateral at base, gradually acuminate at apex, one side acute to obtuse, the other rounded or subcordate, dark green and weakly glossy above, moderately paler and matte below; *midrib* flattened-convex and concolorous above, narrowly rounded and slightly paler below, drying slightly raised and concolorous to slightly darker, often orange-brown below; *primary lateral veins* 7 to 11 pairs, arising at 40°–50° near apex, 50°–60° near base, weakly quilted-sunken above, weakly convex-pleated below, drying only weakly visible above, slightly raised and darker than surface below; minor veins few, moderately obscure. INFLORESCENCE 1 per axil; *peduncle* 4–6.5 cm × 6–

4.5 mm at midpoint, pale green, glossy; *spathe* 11–16 × 1–1.7 cm, pale yellow-green, matte outside, slightly paler and glossy inside; *spadix* 9.5–11.5 cm long, the pistillate portion 5.8–7 cm × 9 mm at base, 6 mm diam. at 1 cm from apex, contiguous with the staminate portion; pistils 38 to 41, sparsely arranged with no more than 3 across the axis; staminodia 3 to 4, not fused at base.

*Distribution and habitat.* *Dieffenbachia williamsii* ranges from Peru (Loreto) to Bolivia at 200–1300 m elevation. In Bolivia it is known from the departments of Beni (Ballivián, Yacuma), Cochabamba (Carrasco, Chapare), La Paz (Iturrealde, Franz Tamayo, Nor Yungas), and Santa Cruz (Ichilo).

*Dieffenbachia williamsii* is characterized by its small, mostly yellow-green-drying, ovate to ovate-elliptic blades, petioles that dry sharply sulcate, and especially by the spadix, which lacks a sterile area between the staminate and pistillate portions.

The first collection of the species was made by R. S. Williams on 28 November 1901 at San Buenaventura in La Paz (across the river from Rurrenabaque), and the species is named in his honor.

*Paratypes.* PERU. **Loreto:** Coronel Portillo, Arboretum von Humboldt, Carretera Federico Basadra, km 99, Diaz et al. 685 (MO). BOLIVIA. **Beni:** Ballivián, 12 km by lumber trail, SW of km 12 on Yucumo–Rurrenabaque Rd., Kessler et al. 10795 (LPB, MO); Yucumo–Rurrenabaque, Escuela Técnica Agropecuaria Río Colorado, 35 km N of Yucumo, Killeen et al. 2881 (LPB); Ballivián and Yacuma, Est. Biol. Beni, Cerro Ocho, Guareco 85 (LPB, MO); Yacuma, Chimán 8, Acebey 48 (LPB, MO). **Cochabamba:** Chapare, Carrasco NP, Cavernas de Repechón, Kessler et al. 8315 (LPB, MO); Par. Machia, 1 km E of Villa Tunari, Kessler et al. 8472 (LPB, MO); 1.5 km SE of El Palmar on rd. to Avispas, Kessler et al. 8184 (LPB, MO); El Palmar, km 155 on old Cochabamba–Villa Tunari Rd., Kessler et al. 8118 (LPB, MO); km 159, Kessler et al. 8224 (LPB, MO); Carrasco NP, Cavernas del Repechón, Kessler 8253 (LPB, MO), 8290 (LPB, MO); S of Campamento Ichoa, Acebey 563 (LPB, MO), 580 (LPB, MO); km 143 on old rd. from Cochabamba to Villa Tunari, Kessler 7567 (LPB, MO); km 149 on old rd. from Cochabamba to Villa Tunari, Kessler et al. 7995 (LPB). **La Paz:** Caranavi, Serranía Bella Vista, Caranavi–Sapecho, km 42, Kessler et al. 11516 (LPB); Iturrealde, Río San Antonio, 46 km de Ixjamas a Alto Madidi, Kessler et al. 11128 (LPB, MO); San Buenaventura, R. S. Williams 533 (K); Nor Yungas, Polo-Polo bei Coroico, Buchtien 3657 (US); 4.5 km below Yolosa, then 10 km W on rd. up Río Huarinilla, Solomon 8562 (LPB, MO); Franz Tamayo, Madidi NP, Refugio Chalalán, vic. Campamento Estabon, Kroemer & Acebey 1111 (LPB), 1134 (LPB, MO); 42 km W and 1 km N of Rurrenabaque, Helme 423 (LPB); Sud Yungas, 5 km de Chamaca a La Asunta, Kessler et al. 5803 (LPB, MO). **Santa Cruz:** Ichilo, 3 km by river above Campamento Macuñucu, Kessler et al. 8700 (LPB, MO).

#### MONSTERA

**Monstera kessleri** Croat, sp. nov. TYPE: Bolivia. Cochabamba: Chapare, Parque Machia, 1 km E of Villa Tunari, 16°48'S, 65°24'W, 350 m, 14 Sep. 1996, T. Kessler 8479 (holotype, MO-05042748; isotype, LPB). Figures 4C, D, 5A.

Planta hemiepiphytica; petiolus 15–36 cm longus, vaginatus ad geniculum; lamina anguste ovata, ovato-elliptica, 25–41(46.5) cm longa, 13–25 cm lata; pedunculus 22 cm longus, ca. 5 mm diam. in sicco; spadix 11.5 cm longus, 2.5 cm diam.

Hemiepiphyte; stems with pre-adult internodes 1–2 cm long, drying smooth, dark yellow-brown, densely and minutely granular on magnification; adult internodes unknown. *Petioles* 15–36 cm long, sheathed throughout to geniculum, drying matte, medium-dark yellow-brown, weakly and closely ridged; sheath margin narrow, sometimes flaking free. Leaf *blades* narrowly ovate to ovate-elliptic, 25–41(46.5) × 13–25 cm, (1.2)1.6–1.9(2.7) times longer than wide, 1.1–1.7 times longer than petioles, rounded to acute at apex, acute to weakly attenuated or rounded at base, drying dark brown and matte above, dark yellow-brown and semiglossy below; margins entire and with a single elongated perforation or with only 1 to 2 deep, narrow sinuses open to the margin (only 1 deep sinus on pre-adult blades); *midrib* drying weakly raised and concolorous above, convex and slightly paler below; *primary lateral veins* 9 to 11 pairs, arising at an acute angle then spreading at 30°–50° angle, flat and weakly visible above, convex and slightly darker than surface below; minor veins weak, fine, parallel. INFLORESCENCES with *peduncle* 22 cm long, ca. 5 mm wide on drying, drying dark yellow-brown; *spadix* 11.5 cm long, 2.5 cm diam. Styles 3–4.5 mm diam. on drying, irregularly angular, matte, concave; stigma raised, oblong, 1.8–2.2 mm long, 0.3–0.4 mm wide, the margins light brown, with a deep medial furrow.

*Distribution and habitat.* *Monstera kessleri* is known only from the type, collected near Villa Tunari in Cochabamba, Bolivia, but juvenile material collected near Rurrenabaque and an aberrant specimen from Peru (see below) almost certainly belong to this species, too.

The new species is characterized by its narrowly ovate, dark brown-drying leaf blades with only 1 to 2 deep sinuses per side. They are similar in size, shape, and color to those of *Monstera spruceana* (Schott) Engler, which also has similar pre-adult blades, but differs in having the peduncle shorter than the spadix (vs. about twice as long in *M. kessleri*). A collection from the department of La Paz,

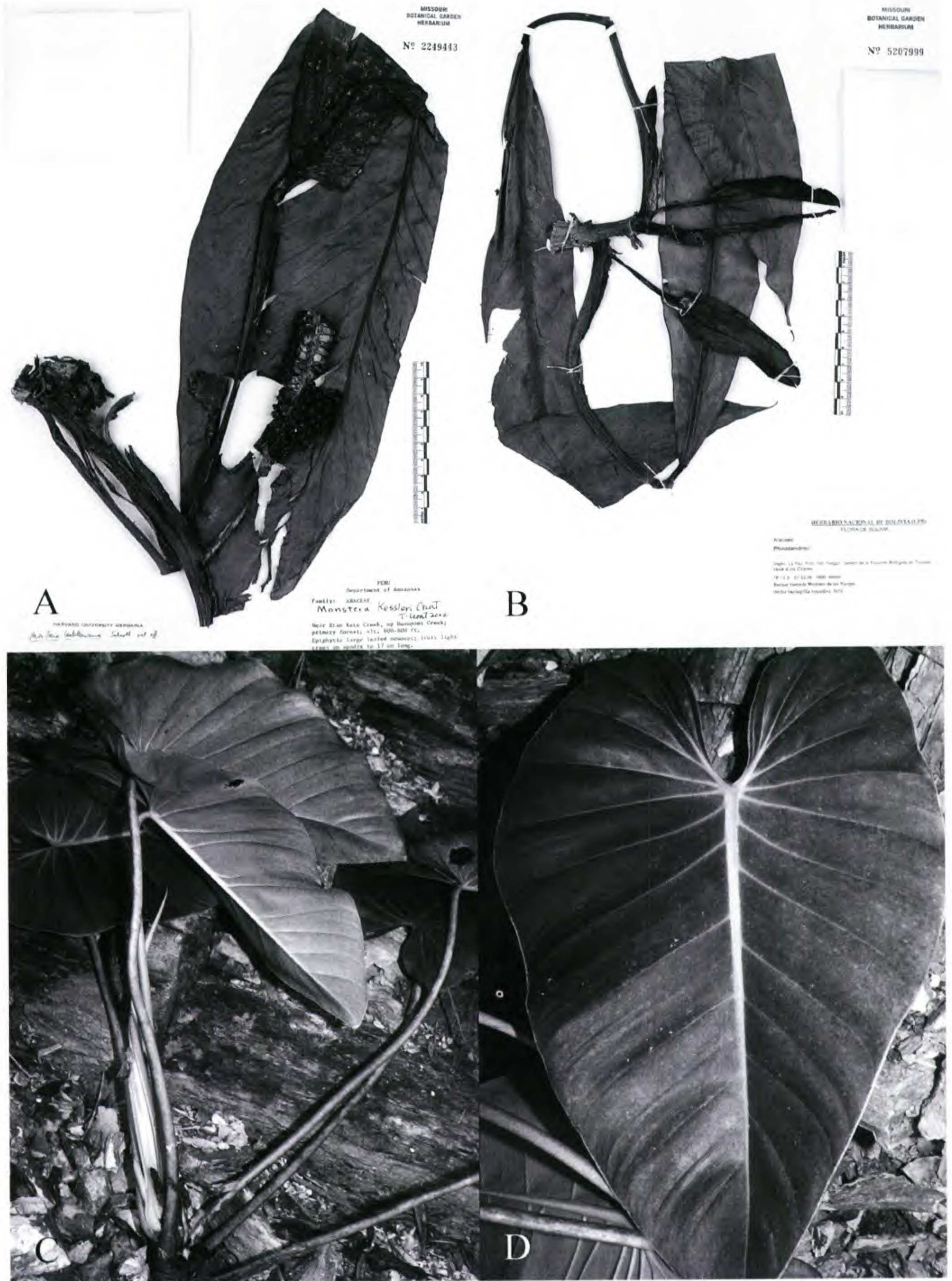


Figure 5. —A. *Monstera kessleri* Croat (Kessler 8479). Adult plant with blade lacking perforations [hole in leaf is an artifact of collecting]. —B. *Philodendron cotapatense* Croat & Acebey (Kroemer & Acebey 1558). Type specimen. C, D. *Philodendron kroemeri* Croat & Acebey (Croat & Acebey 84820). —C. Habit. —D. Close-up of adaxial surface of blade.

Province Franz Tamayo (*Helme* 252), collected 42 km west and 1 km north of Rurrenabaque at 14°25'S, 67°55'W, 330 m, is very likely a juvenile plant of *M. kessleri*, and it has exerted leaves rather than the shingle-leaves characteristic of *M. spruceana*.

The species is named in honor of Michael Kessler, a German plant ecologist from the University of Göttingen who has devoted much of his professional career to the plants of Bolivia. Kessler has collected many interesting and new Araceae during the course of his studies and made an extensive study of the Araceae in Bolivia (Kessler & Croat, 1999).

#### PHILODENDRON

***Philodendron cotapatense*** Croat & Acebey, sp. nov. TYPE: Bolivia. La Paz: Nor Yungas, Cotapata NP, trail to Est. Biol. Tunquini, toward Río Cedroni, 16°12'S, 67°52'W, 1800 m, 12 Sep. 2000, T. Kroemer & A. Acebey 1558 (holotype, MO-5207999; isotype, LPB). Figure 5B.

Planta hemiepiphytica; internodia 1–3 cm longa, 1.7 cm diam.; cataphylla 8 cm longa, acute 1-costata, decidua; lamina oblonga, 41.5–43 cm longa, 6–6.7 cm lata, anguste acuta ad basim; nervis primariis non manifestis; inflorescentiae 2 in quaque axilla; pedunculus 4–6 cm longus; spatha 8.5–9.5 cm longa.

Appressed-climbing hemiepiphyte; internodes 1–3 cm long, 1.7 cm diam., drying initially blackish and smooth, becoming minutely, finely and irregularly ridged, matte, finally light yellow-brown and smooth with big folds, sometimes with the epidermis loosening; cataphylls 8 cm long, sharply 1-ribbed on drying, drying blackened, deciduous. Leaf blades oblong, 41.5–43 × 6–6.7 cm, 6.9 times longer than wide, 2–2.3 times longer than petioles, narrowly acute at base, narrowly caudate-acuminate at apex, semiglossy, slightly bicolored, drying medium gray-green above, slightly paler and yellowish gray-green below; midrib broadly convex and slightly darker than surface above, narrowly convex and darker than surface below, drying finely and inconspicuously ridged on both surfaces; primary lateral veins not at all apparent; minor veins numerous, fine, arising at 35°–45° angle, sometimes drying weakly undulate. INFLORESCENCES 2 per axil; peduncle 4–6 cm long, drying black, 3 mm diam. midway; spathe 8.5–9.5 cm long, drying 1.2–1.5 cm diam.; stipe 4 mm long in front, 5 mm wide; spadix 8.7 cm long, ca. 0.8 mm shorter than the spathe; pistillate portion of spadix 2.1 cm long, drying 7 × 3 mm wide; staminate portion of spadix

6.5 cm long, drying 5 × 8 mm wide. Pistils 0.8–1.0 mm long; 5- to 6-locular; stigmas 0.6–0.8 mm diam.; ovules 1 per locule, basal 0.6–0.7 mm long; enveloped in a gelatinous envelope 2 mm long; funicle ca. 2 times as long as ovule.

*Distribution and habitat.* *Philodendron cotapatense* is endemic to Bolivia, where it is known only from the type locality in Parque Nacional Cotapata (hence the name), in La Paz Department, at 1800 m elevation.

The species is a member of section *Calostigma* (Schott) Pfeiffer, subsection *Glossophyllum* (Schott) Engler, series *Glossophyllum* (Schott) Croat. It is characterized by its somewhat grayish drying, narrowly oblong-oblongate blades that lack any obvious primary lateral veins and its moderately small, narrowly pedunculate, blackish drying inflorescences. It is closest to *P. paxianum* K. Krause, which differs in having leaf blades with distinct primary lateral veins.

An apparently juvenile collection (*Solomon* 9549) has blades with similar venation, but leaves that dry light yellow-green. It is uncertain if that collection belongs here or if it represents another species.

*Paratype.* BOLIVIA. La Paz: Nor Yungas, Est. Biol. Tunquini, Hornuni Bajo, senda del campo Dn. Pedro al pajonal detrás del río Cedroni, *Bach et al.* 1717 (LPB, MO).

***Philodendron kroemeri*** Croat, sp. nov. TYPE: Bolivia. La Paz: Nor Yungas, Serranía Bella Vista, Caranavi–Yucumo, 34.3 km NE of Caranavi, 15°41'30"S, 67°29'37"W, 1567 m, 5 Aug. 2000, T. B. Croat, A. Acebey & T. Kroemer 84820 (holotype, MO-5185172–3; isotypes, B, F, GOET, K, LPB, NY, US, USC, USM). Figures 5C, D, 6A.

Planta hemiepiphytica; internodia brevia, 3 cm diam.; cataphylla 22 cm longa, acute 2-costata, persistentia intacta; petiolus 43 cm longus, subteres; lamina late ovata, 42.5 cm longa, 28.5 cm lata, profunde lobata ad basim; lobi postici 12.5–14 cm longi, 10 cm lati; nervis basalibus 6–7 utroque; nervis primariis lateralibus 6 utroque; inflorescentiae 3–7 in quaque axilla; pedunculus (1.5)4–7.7 cm longus; spatha 4.5–5.5 cm longa; spadix 4.8–5.2 cm longus; pars masculina 1.2–2.1 cm longa, 6 mm diam.; pars feminea 3.0 cm longa, 6.5–7 mm diam.; ovarium 4–5 loculare; ovula 1 in quoque loculo.

Appressed-climbing hemiepiphyte; internodes short, 5–6 cm long, to 3 cm diam., drying dark yellow-brown, narrowly ridged longitudinally; cataphylls 22 cm long, sharply 2-costate, medium green, obscurely darker green-lineate, marcescent and persistent semi-intact at least at the upper



Figure 6. —A. *Philodendron kroemeri* Croat & Acebey (Croat & Acebey 84820). Close-up of stem, petiole bases, and inflorescences. B, C. *Rhodospatha mukuntakia* Croat (Croat et al. 84386). —B. Habit. —C. Close-up of petioles with fibrous sheath and an unopened inflorescence. —D. *Stenospermation killipii* Croat & A. Gomez (Plowman & Schunke 7402). Potted plant showing erect habit with somewhat cernuous inflorescence.

nodes, drying light yellowish brown, soon deciduous. *Petioles* 43 cm long, subterete, medium dark green and semiglossy, obtusely flattened adaxially, unmarked, drying dark brown to blackened, 8–10 cm diam., matte. Leaf *blades* broadly ovate, 42.5 cm long, 28.5 cm wide, 1.5 times longer than wide, subcoriaceous, dark green and weakly glossy to semiglossy above, slightly paler and semiglossy below, abruptly short-acuminate at apex, deeply lobed at base, drying dark blackish brown above, slightly paler and dark yellow-brown below; anterior lobe 32.5 cm long, the margins broadly convex; posterior lobes 12.5–14 cm long, 10 cm wide; basal veins 6 to 7 pairs, the 1st pair free or nearly so to base, 3rd and higher order basal veins coalesced 1.5–4 cm; posterior rib scarcely naked, mostly to ca. 1 cm; *midrib* broadly convex and concolorous to slightly paler above, convex to narrowly rounded and slightly paler below, drying slightly darker than surface above, moderately darker and irregularly and finely striate below; *primary lateral veins* 6 pairs, arising at 55° angle near apex, to 65°–85° angle in lower half of blade, convex, darker than surface, sometimes drying blackened and much darker than surface; minor veins moderately indistinct with a few visible, drying close and fine but not markedly visible. INFLORESCENCES 3 to 7 per axil; *peduncle* (1.5)4–7.7 cm long, 9 mm diam., pale green at base, darker green toward apex, dark brown to blackened on drying; *spathe* white at anthesis, becoming pale green, greenish white and glossy inside, 4.5–5.5 cm long, 6–9 mm diam., abruptly pointed at apex, drying blackened to dark brown; *spadix* 4.8–5.2 cm long; staminate portion 1.2–2.1 cm long, 6 mm diam.; sterile staminate portion not obvious on live material; pistillate portion 3.0 cm long in front, 2.3–2.6 cm long in back, 6.5–7 mm diam. at base, 6.0 mm diam. at apex. Pistils bottle-shaped, subterete to rhombic in cross section, the upper 1 mm tapered inward, 1.0–1.7 mm diam.; locules 4 to 5 per ovary; ovules 1 per locule, 0.6–0.9 mm long, 0.3–0.4 mm diam.; placentation basal; funicle shorter than ovule; stigma 0.5–0.7 mm diam., 2–3 mm thick; androecium 1.0–1.7 mm diam., broadly convex at apex, subrounded to irregularly angular, 4- to 5(6)-sided, the angles broadly rounded. Fruits not known.

*Distribution and habitat.* *Philodendron kroemeri* is known from Bolivia at the Cotapata National Park in La Paz and Peru at Pasco Province (Oxapampa) at 1650–2400 m elevation.

The new species is characterized by its persistent, more or less intact cataphylls, terete, dark brown to black-drying petiole, broadly ovate, dark

blackish brown-drying blades, and cluster of 3 to 7 inflorescences. Similar material has been collected in Peru, Department of Pasco, in the vicinity of Oxapampa at 1600–2080 m [Vásquez *et al.* 26142, Soukup 2331 (GH); Foster *et al.* 7736 (F, MO); D. Smith 2705 (MO, USM)]. This material may prove conspecific, but differs in having deciduous cataphylls and blades that dry reddish brown on the lower surface (rather than dark yellow-brown).

The species is named in honor of German botanist Thorsten Kroemer, specialist on the bromeliads of Bolivia, who has collected many interesting and new species of Araceae during the course of investigations for his Ph.D. thesis from the University of Göttingen.

*Paratypes.* BOLIVIA. **La Paz:** Nor Yungas, Cotapata NP, Est. Biol. Tunquini, senda del campo de Don Pedro al camino de la mina, García 4435 (LPB); Hornuni Bajo, near Campamento Don Pedro, Kroemer & A. Acebey 1745 (LPB, MO), 1590 (LPB, MO); Hornuni Bajo, senda cafetal al camino de la mina, Bach *et al.* 1623 (LPB, MO). PERU. **Pasco:** Oxapampa, Chontabamba, carretera camino a La Suiza antigua (km 10–13), Ligan *et al.* 373 (B, K, MO, US, USM); carretera camino a La Suiza nueva, Ligan *et al.* 376 (MO, USM).

#### RHODOSPATA

**Rhodospata mukuntakia** Croat, sp. nov. TYPE: Bolivia. La Paz: Abel Iturralde, Tumupasa–San José de Uchupiamonas, NW of Tumupasa, Madidi NP, 5.5–5.8 km above jct. to San José near Tumupasa, 15°45'N, 67°50'W, 830–850 m, 9 Aug. 2000, T. B. Croat, A. Acebey & T. Kroemer 84386 (holotype, MO-5187103; isotypes, B, F, K, LPB, NY, US, USM, UB). Figure 6B, C.

Planta terrestris; internodia brevia, 2.5–3 cm diam.; petiolus 35–71 cm longus; lamina plus minusve elliptica, 37.5–63 cm longa, 18–31 cm lata; nervis primariis lateralibus 25–35 utroque; pedunculus 16–35 cm longus; spathe crenea, plus minusve elliptica; spadix 9.5–16 cm longus, 1–1.5 cm diam., stipitatus 5–18 mm, dilutus aurantiacus vel cremeus.

Terrestrial herb, 50–100 cm tall; *internodes* short, 2.5–3 cm diam., the epidermis always covered by overlapping petiole sheaths. *Petioles* 35–71 cm long (averaging 54 cm), drying light yellowish brown, closely fissured adaxially, deciduous, sheathed to within 1–9 cm of the geniculum; sheath light brown, highly weathered, with pale, ± parallel strands of fibers and sometimes with fragments of brown epidermis persisting; geniculum 1.5–4 cm long, narrowly sulcate, drying sharply sulcate, remote 2.5–3.5 cm from the blade. Leaf *blades* ± elliptic, 37.5–63 × 18–31 cm, averaging 55 × 26



cm, 0.76–1.2 times longer than petioles, broadest at the middle, slightly inequilateral (one side ca. 1 cm wider), somewhat inequilateral, acute to obtuse and attenuate at base, acute to obtuse or narrowly rounded and abruptly acuminate at apex, drying brownish green above, reddish brown beneath; *midrib* sunken and concolorous above, much thicker than broad below, drying brown, softly and densely crustose-puberulent; *primary lateral veins* 25 to 35 per side, (4)7–21 mm apart (mostly 15–20 mm) arising at an acute angle then spreading at 65°–85° angle, weakly curved to the margin, drying dark brown, smooth; interprimary vein 1, usually much weaker than the primaries; minor veins usually 2 (sometimes 3), alternating with the interprimary and primary veins, the interprimary and minor veins usually sparsely granular; cross-veins conspicuous and close, extending across the whole surface, the surface greenish and densely reddish granular punctate on magnification. INFLORESCENCE erect; *peduncle* 16–35 cm long, drying 3–5 mm diam., 0.29–0.79 times as long as the petioles, averaging about ½ as long as petioles; spathe cream, turning reddish brown on drying, somewhat elliptic, acute at apex, ca. 1.5 cm longer than the spadix; *spadix* 9.5–16 cm long, 1–1.5 cm diam., to ca. 7 mm diam. ca. 1 cm below apex, tapered slightly toward both ends, stipitate 5–18 mm, light orange to cream (variously described on labels as B & K yellow-red 8/2.5, 8/5, yellow-red 9/7.5, B & K yellow 8/2.5, and B & K yellow-red 9/10). Pistils often regularly pentagonal or 4-sided, sometimes irregularly 5- to 6-sided, 1–2 mm diam. (those at the base of the spadix often larger), frequently 2.4–3 mm diam., the sides straight to weakly convex, rarely concave; style faintly purplish brown with a frost-like matte surface; stigma 0.6–0.9 mm long, 0.3–0.4 mm wide, brown, raised, usually sulcate medially; anthers narrowly pointed toward apex, 1.8 mm long, 0.7 mm diam., promptly weathering at apex.

*Distribution and habitat.* *Rhodospatha mukuntakia* ranges from southern Colombia (Putumayo) to central Peru (Amazonas, Cuzco, and Madre de Dios) and Bolivia (La Paz) from 180 to 930 m. Most collections are from Nangaritza Cantón (at 930 m) in Zamora-Chinchipe, Ecuador, and the drainage of the Río Santiago in the Department of Amazonas at 180–200 m elevation in Peru.

*Rhodospatha mukuntakia* is recognized by its terrestrial habit, short internodes obscured by the petiole bases, reddish brown-drying petioles, ribbed adaxially and with a deciduous, highly fibrous sheath extending to within 1–9 cm of the

geniculum. The geniculum also dries sharply sulcate, the blades are more or less elliptic, drying reddish brown and reddish granular-punctate on the lower surface with prominent, close cross-veins, the lower midrib densely crustose-puberulent.

The species epithet is based on the common name “mukuntak” used by the Aguaruna indigenous people of the Río Cenepa and Río Santiago drainages in northern Amazonas, Peru, one of the localities where most collections of this species have been made.

*Paratypes.* COLOMBIA. **Caquetá:** 10 km SW of San José de Fragua, SW of Florencia, *Davidse et al.* 5704 (COL, MO). **Putumayo:** Mocoa, *Schultes & Cabrera* 19045 (US); Villa Garzón, Río Gineo, 8 km W of Villa Garzón, *Plowman* 2057 (F, GH). ECUADOR. **Morona-Santiago:** Pumpuentza, WNW of village, *Brandbyge & Asanza* 32333 (AAU); Pumpuentza, SSW of village, *Brandbyge & Asanza* 32431 (AAU); Los Tayos, *L. Rodríguez et al.* 315A (MO); Taisha, *Brandbyge & Asanza* 31879 (AAU, MO); Gualaquiza, Misión Bomboiza Salesiana, *Sparre* 19139 (S). **Napo:** Res. Florística “El Chuncho” Payamino, 5 km al NW de Coca, Est. Exp. INIAP-Napo, *Cerón* 2407 (MO); vic. Tena, *Asplund* 8897 (MO); Río Aguarico near confluence with Río Pavayacu Bravo, *Gomez* 236 (MO). **Sucumbios:** Cantón Gonzalo Pizarro, Parroquia Pto. Libre (San Pedro de los Cofanes), Cofán Sinangüie, *Cerón et al.* 22078 (QAP). **Zamora-Chinchipe:** Nangaritza, Cordillera del Cóndor, Shaimi, frente a destacamento militar, Río Nangaritza, *Palacios et al.* 8711 (MO, QCNE); Shaime, jet. of Río Nangaritza and Río Numpatakaime, *Palacios* 6611 (MO, QCNE); Nangaritza, Cordillera del Cóndor, Parroquia Guayzimi, Campamento militar Miazí, S of Río Nangaritza, *Cerón et al.* 17870 (QAP). PERU. **Amazonas:** 1 km below La Poza, E of Río Santiago, *D. Peña* 128 (MO); Río Cenepa, near Huampama, near Chávez Valdivia, *Kujikat* 312 (MO); Bagua, La Peca, Cordillera Colán, SE of La Peca, 3rd camp, *Barbour* 4143 (MO, USM); Shimpunts, chacra al lado de Shimpunts, *Ancuash* 1321 (MO); vic. Kusu, Río Numpatkin, Río Cenepa drainage system, monte orilla de Chapis, *Ancuash* 7410 (MO); ca. 5 km E of Chávez Valdivia, *Ancuash* 1169 (MO); S of Huampami trail to house of Theodora, S of Río Cenepa, *Berlin* 1665 (MO); Kusu, Río Numpatkin, vic. Kusu, *Kayap* 515 (MO, US); Condoreanqui, Río Santiago, 2–3 km behind Caterpiza, *Tunqui* 904 (MO); 2 km behind Caterpiza, E of Caterpiza, ca. 65 km N of Pinglo, *Huashikat* 393 (MO), 2060 (MO), 2256 (MO), 2287 (MO), 2305 (MO), 2342 (MO); 1 km behind Caterpiza, E of Caterpiza, Río Santiago, *Huashikat* 731 (MO), 886 (MO); Río Santiago, otra banda de Caterpiza, 2 km en trocha de metallar, *Tunqui* 128 (MO). **Cuzco:** La Convención, Echarati Cashiriari, 3 well site, 5.0 km S of Camisea River, *Núñez et al.* 23980 (MO, US). **Madre de Dios:** Manunear Shintuya on rd. to Salvación, *Plowman & Davis* 5076 (GH). **San Martín:** Mariscal Cáceres, Santa Cruz, *Schunke* 7991 (MO). BOLIVIA. **Beni:** Ballivian, Rurrenabaque–Sapecho, 21.7 km NW of La Cascada, 38.8 km NW of Las Delicias, *Croat et al.* 84666 (LPB, MO). **Cochabamba:** Chapare, vic. Villa Tunari, along Río Espíritu Santo on trail to Baja Copacabana, *Croat* 51281 (LPB, MO). **La Paz:** Sud Yungas, Caranavi–Yucumo, 47.4 km NE of Yucumo, 5.1 km from border of Beni, *Croat et al.* 84350 (LPB, MO).

STENOSPERMATION

**Stenospermation dictyoneurum** Croat & Acebey, sp. nov. TYPE: Bolivia. La Paz: Nor Yungas, Serranía Bella Vista, Caranavi–Yucumo, 37.6 km NE of Caranavi, 15°40'37"S, 67°29'34"W, 1508 m, 5 Aug. 2000, T. B. Croat, A. Acebey & T. Kroemer 84270 (holotype, MO-5185298; isotypes, K, LPB, US). Figures 7C, D, 8A.

Planta epiphytica; internodia 1.5–2 cm longa. Petiolus (10)13–21 cm longus; lamina 13–31 cm longa, 3–5.3 cm lata; pedunculus 22–29 cm longus, 1.5–2.5 mm diam., atrobrunneus in sicco; spatha nivea; spadix niveus albus, 3.3–6.2 cm longus, 5–10 mm diam.

Epiphyte at 2–3.5 m; stems soon brown; internodes 1.5–2 cm long, drying 6–7 mm diam., usually drying dark brown and moderately smooth, sometimes gray and weakly glossy. Petioles (10)13–21 cm long, sheathed 0.43%–0.71% their length, medium green, matte, drying dark brown; sheath erect, narrowly rounded at apex, ending 2.2–11 cm below the geniculum. Leaf blades 13–31 × 3–5.3 cm, 3.5–6.3 times longer than wide, subcoriaceous, dark green and semiglossy above, moderately paler and glossier below, drying dark yellow-brown to grayish brown and matte above, yellowish brown to olive-green and semiglossy to weakly glossy on lower surface; midrib sunken and slightly paler above, thicker than broad and slightly paler below, drying weakly raised, sometimes narrowly sunken toward apex, ± concolorous above, drying narrowly raised on lower surface near the base, convex to weakly ridged and concolorous to slightly darker below; primary lateral veins weakly visible above, scarcely apparent below, drying weakly, narrowly and acutely raised above, much weaker and somewhat darker below, scarcely more apparent than the minor veins below; minor veins also acute and narrowly raised above with numerous wavy, acutely erect cross-veins, these sometimes appearing to be reticulate, those of the lower surface scarcely apparent; lower surface weakly and densely granular. INFLORESCENCE erect to weakly cernuous; peduncle 22–29 cm long, drying dark brown, 1.5–2.5 mm diam.; spathe white, soon brown, promptly deciduous; spadix directed weakly to one side, greenish white, 3.3–6.2 cm long, 5–10 mm diam., cylindroid, rounded at both ends. Flowers 4 to 5 visible per spiral, 1.0–1.4 mm long, 1.2–1.4 mm wide, truncate at apex, drying dark brown; stigma subglobose, ca. 0.5 mm wide, brush-like, raised above the surface of the stigma.

*Distribution and habitat.* *Stenospermation dic-*

*tyoneurum* is known only from Bolivia in La Paz at 1300–1850 m elevation.

The new species is characterized by its generally epiphytic habit, rather short, slender internodes, petioles sheathed usually to  $\frac{2}{3}$ – $\frac{3}{4}$  their length, and leaf blades drying dark brown above, moderately paler and yellow-brown below, with the minor veins narrowly and acutely raised on the upper surface with distinct oblique and transverse cross-veins and sparse, short pale lineations between the minor veins.

The species epithet is based on the Greek “diction” (net) and “neuron” (nerved) alluding to the prominent net-like reticulum of its veins.

*Paratypes.* BOLIVIA. **La Paz:** Caranavi, Serranía Bella Vista, Caranavi–Sapecho, km 37, Kessler *et al.* 11348 (LPB, MO); Nor Yungas, Est. Biol. Tunquini, Bach 969 (LPB, MO), Kroemer & Acebey 1556 (LPB, MO); Saavedra, Camata to Apolo, km 10, Kessler 10323 (LPB, MO).

**Stenospermation killipii** Croat & A. Gomez, sp. nov. TYPE: Peru. Huánuco: Leóncio Prado, Hermilio Valdizán, La Divisora, along rd. from Pumahuasi to La Cumbre, 1600–1660 m, originally collected live by T. Plowman, cultivated at MO, 26 June 1978, T. B. Croat 78348 (holotype, MO-05015335; isotypes, B, F, K, NY, US, USM). Figures 6D, 7A, B.

Planta terrestris vel epiphytica; internodia 0.5–4.0 cm longa, 1.2–2.0 cm diam.; petiolus 9–12.5 cm longus; lamina elliptica vel oblongo-elliptica vel obovato-elliptica, 15–24 cm longa, 3.5–6.5 cm lata, superficie dilute brevilineata; pedunculus 23–33 cm longus; spatha 8–9.5 cm longa, 2.5 cm lata, persistens, viridis vel virello-alba.

Terrestrial or epiphytic; stems clustered, (0.5)1–1.5 m tall; internodes 0.5–4.0 cm long, 1.2–2.0 cm diam., dark green, medium green, becoming gray-green, weakly glossy, drying dark brown, closely ridged, densely and finely granular. Petioles 9–12.5 cm long, sheathed from  $\frac{2}{3}$  its length or to the geniculum, matte to weakly glossy, dark olive-green; sheath decurrent, incurled but mostly open; free portion sub-terete, bluntly sulcate; geniculum 1.8 cm long, sharply sulcate, drying sharply sulcate. Leaf blades elliptic to oblong-elliptic or obovate-elliptic, 15–24 cm long, 3.5–6.5 cm wide, 2.5–4.6 times longer than wide, 1.5–1.6 times longer than petioles, subcoriaceous, acute at base, acuminate at apex, dark green and weakly glossy to subvelvety above, moderately paler and semiglossy to weakly glossy below, drying dark yellow-brown to yellowish green above, medium yellow-brown below; midrib obtusely and deeply sunken and concolorous above, slightly paler below, drying darker below, drying finely striate; primary lateral veins not apparent

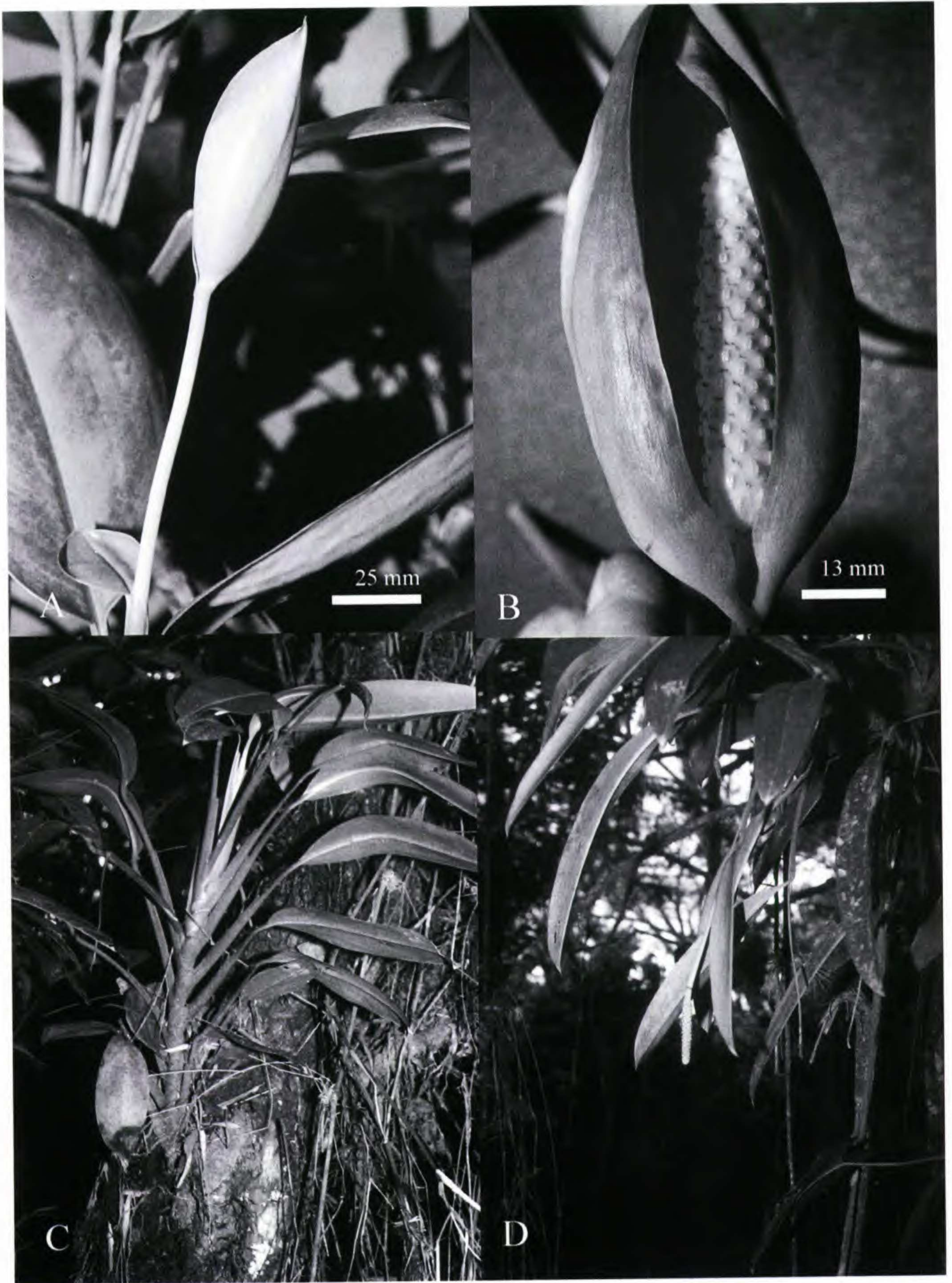


Figure 7. A, B. *Stenospermation killipii* Croat & A. Gomez (Plowman & Schunke 7402). —A. Erect inflorescence showing straight peduncle and elliptic spathe. —B. Close-up of inflorescence with open spathe exposing spadix. C, D. *Stenospermation dictyoneurum* Croat & Acebey (Croat et al. 84270). Habit.

above, weakly visible below; minor veins drying weakly raised, with numerous pale, short-pale-lineations in between the minor veins above, weakly raised but less dense below with fewer pale cellular inclusions. INFLORESCENCES erect; *peduncle* 23–33 cm long, drying dark brown 1–2 mm diam.; *spathe* 8–9.5 cm long, 2.5 cm wide at anthesis, 7.5 cm wide when flattened, green to greenish white, erect, semiglossy outside, weakly glossy inside, persisting after anthesis, dark reddish brown; *spadix* white, 4.5–7 cm long, 1–1.5 cm diam., with reduced flowers and bluntly pointed at apex. Pistils 3–3.5 mm diam., 8 to 9 visible per spiral.

*Distribution and habitat.* *Stenospermatum killipii* ranges from Ecuador (Zamora-Chinchipe) and Peru (Amazonas), San Martín (Rioja), Huánuco (Coronel Portillo, Leoncio Prado), Junín (Oxapampa, Tarma), Ayacucho (La Mar), and Cuzco (Paucartambo) to Bolivia at (700)1600–2100 m elevation. In Bolivia it occurs in Cochabamba (Chapare) and La Paz (Sud Yungas). It may also occur in Brazil in Bahia (see below).

*Stenospermatum killipii* is characterized by its erect, frequently terrestrial habit, long stems, often fully sheathed petioles, weakly glossy to subvelvety, dark yellow-brown to yellow-green-drying blades, and especially by its short spadix and persistent spathe.

The new species is similar to *Stenospermatum wallisii* Masters in having a persistent spathe, but differs in having leaf blades that dry yellow-green to light yellow-brown and lack the dense, pale, short lineations between the minor veins.

*Gentry et al. 21954*, from the far north of Peru in Loreto (Maynas: Río Gueppi), is very similar to *S. killipii*, but differs in being from only 200 m elevation and in having a persistent spathe and stems drying a paler rusty brown. Since no other collection was made below 1000 m, it seems likely that this represents another species.

The new species is named after Smithsonian botanist E. P. Killip who, along with A. C. Smith, was the first (1929) to collect it in Peru. This species was described with A. Gomez, a former student of Tom Croat, who studied the *Stenospermatum* of Central and South America for her master's thesis at St. Louis University in St. Louis, Missouri, U.S.A.

*Paratypes.* ECUADOR. **Morona-Santiago:** Sangay NP, trail to Sardina Yacu, Río Sardina-Río Volcán, *Montalvo & Cerón 11A* (GAP). **Zamora-Chinchipe:** Nangaritza Cantón, Río Nangaritza, Miazí, confluence of Río Chumbiriatza-Río Nangaritza, *Palacios & Neill 6789* (MO, QCNE). PERU. **Amazonas:** near border with San Martín, *van der Werff et al. 16690* (DUKE, MO, SEL, UB,

USM); Bagua, 12 km E of La Peca, *Barbour 2630* (MO); 12–17 km E of La Peca, *Barbour 2527* (MO, USM); Chachapoyas, Rodríguez e Mendoza, Cochamal, localidad "Tinas," Montaña de Yanamonte, *Díaz et al. 4512* (MO). **Ayacucho:** Aina, Huanta-Río Apurímac, *Killip & Smith 22550* (NY, US); La Mar, below Huanhuachayo on the Capprichio-Puncu trail, Río Apurímac valley, *Madison 10255–70* (US). **Cajamarca:** San Ignacio, San José de Lourdes, base of Cerro Picorana, *Díaz et al. 10284* (MO), *10777* (K, MO, NY, UB, USM); San Ignacio, San José de Lourdes, Camaná, *Campos & Corrales 3760* (MO, QCNE, US, USM); base of Cerro Picorana, *Vásquez et al. 26729* (F, MO, USM). **Cuzco:** Paucartambo, Kosñipata Valley, km 150, San Pedro, jct. of Río Unión and Río Kosñipata, *P. Nuñez 11992* (MO). **Huánuco:** Coronel Portillo, Padre Abad, La Divisora, near Río Chino, *Schunke 9275* (MO); Leoncio Prado, Hermillo Valdizán, La Divisora, Pumahuasi-La Cumbre, *Plowman & Schunke 7402* (SEL); 2.8 km N of divide, *Croat & Sizemore 81716* (MO, USM); Cordillera Azul, on rt. 16, near border with Ucayali Department, 38 km N of Tingo María, *Davidson & Jones 3457* (LAM); 39.2 km E of Tingo María on rd. to Pucalpa, *Davidson & Jones 9338* (LAM, MO); Tingo María-Pucalpa, "La Divisora," 3.8 km N of Ucayali border, *Croat & Sizemore 81694* (MO, USM); Tingo María-Huayna Capac, 10.0 km W of Río Huallaga, *Croat & Sizemore 81865* (MO, USM). **Junín:** Chanchamayo Valley, *Schunke 475* (F); Tarma, La Merced-Satipo, ca. 5 km E of La Merced along Río Chanchamayo, *Croat & Sizemore 81924* (MO, USM). **Pasco:** Oxapampa, Chontabamba, *Smith & Brack 3073* (USM); Gran Pajonal, vic. Chequitavo, *Smith 6866* (MO); W of Oxapampa, low pass betw. Chontabamba and Suissa, *Foster & Smith 7572* (F, MO, USM); 20 km W of Oxapampa, pass before La Suiza, *Smith 5381* (MO). **San Martín:** Rioja-Pedro Ruiz, *van der Werff et al. 15464* (MO); 99 km from Rioja on rd. to Pomacocha, *Stein & Todzia 2182* (MO); Elias Soplín Vargas, Centro poblado Porvenir, Yacumama, rd. to Río Negro, *Sánchez V. & Dillon 8066* (F); Nuevo Cajamarca near Poblado Miraflores, *Sánchez V. & Dillon 8462* (CPUN, MO). BOLIVIA. **Cochabamba:** Chapare, Cochabamba-Villa Tunari, vic. of Hotel Caballeros at km 94 from Cochabamba, *Croat 51323* (LPB, MO). **La Paz:** Sud Yungas, de Chulumani, 5 km hacia Irupana-Apa Apa, *Beck 24759* (LPB); Nor Yungas, Cotapata NP, *Kroemer 732* (LPB, MO); Est. Biol. Tunquini, entrance to trail to Hornuni, *Beck 28554* (LPB).

*Cultivated specimens.* PERU. **Huánuco:** Leoncio Prado, Hermillo Valdizán, La Divisora, rd. from Pumahuasi to La Cumbre, 1600–1660 m, originally collected as *Plowman & Schunke 7402*, 12 Oct. 1987, *Croat 68443* (MO).

#### XANTHOSOMA

**Xanthosoma puberulum** Croat, sp. nov. TYPE: Bolivia. La Paz: Nor Yungas, La Paz-Caranavi, Chuspipata-Yolosa, 19.0 km SW of Yolosa, 16°15'55"S, 67°47'18"W, 2234 m, 4 Aug. 2000, *T. B. Croat, A. Acebey & T. Kroemer 84253* (holotype, MO-5185310; isotypes, K, LPB). Figures 8B–D, 9A.

Planta terrestris, 1.5–2.5 m alta; internodia brevia, (9)13–18 cm diam.; petiolus 63–100 cm longus; lamina ovata, sagittata ad basim, 60–85 cm longa, 47–66 cm lata; lobi postici 26–39 cm longi, 20–30 cm lati, nervis inferne



Figure 8. *Stenospermation dictyoneurum* Croat & Acebey (Croat et al. 84270). —A. Close-up of inflorescence. B–D. *Xanthosoma puberulum* Croat (Croat et al. 84253). —B. Leaf blade adaxial surface. —C. Leaf blade, abaxial surface. —D. Stem showing inflorescences.

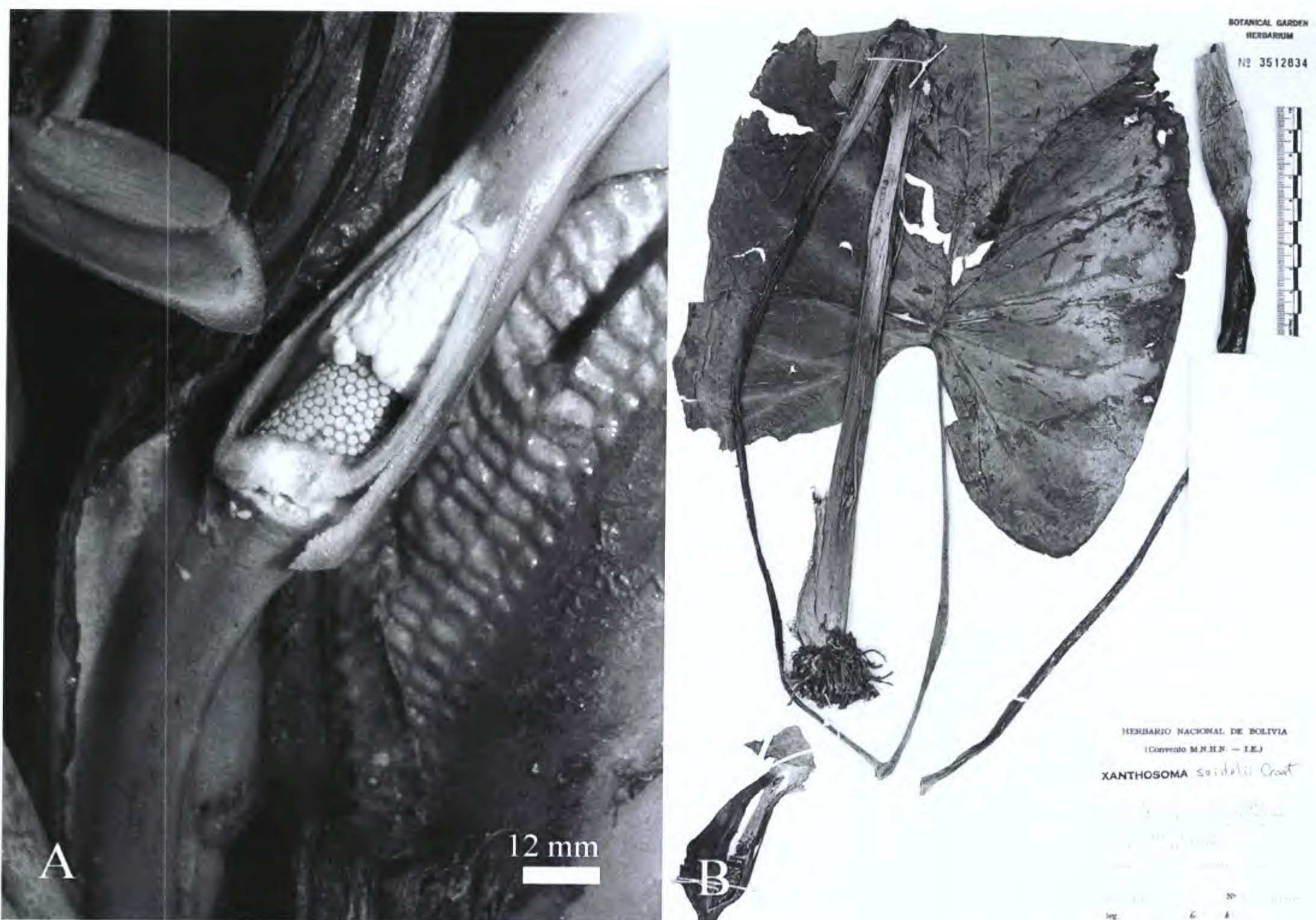


Figure 9. —A. *Xanthosoma puberulum* Croat (Croat et al. 84253). Inflorescence with lower portion cut away to expose pistillate portion and sterile staminate portion of spadix. —B. *Xanthosoma seidelii* Croat (R. Seidel & E. Richter 1198, MO-3512834). Paratype specimen (inset of inflorescence is from second sheet of the same collection, MO-5187956).

puberulentis; inflorescentiae 5–6 in quaque axilla; pedunculus 16–24 cm longus; spathe 15–21 cm longa, tubus 5.5–6.5 cm longus, 2.8–3.4 cm diam.; pistilla viridia.

Terrestrial, 1.5–2.5 m tall; stem 0.5–1.2 m tall; internodes short, (9)13–18 cm diam. at base, 8–11 cm diam. at apex; basal portion of stem repent, brown with pale brown fibers and fragments of epidermis of petiole bases persisting. Petioles 63–100 cm long, ca. 2 cm diam. midway, obtusely flattened adaxially with a faint medial rib, slightly spongy, about as long as or to 1.2 times longer than the blades, erect-spreading, sheathed to above middle, weakly glossy, medium green, very weakly striate, the free portion weakly flattened adaxially, moderately spongy, incurled, slightly paler, bullate and undulate on margins. Leaf blades semi-erect, ovate and deeply lobed at base, 60–85 cm long, 47–66 cm wide, thin, matte-subvelvety above, weakly glossy, medium to dark green above, slightly paler and weakly glossy below, drying dark yellow-brown to medium yellow-green above, moderately paler and yellowish brown to yellowish green below; posterior lobes 26–39 cm long, 20–30 cm wide, obtusely pointed at apex; posterior rib naked for 3–5 cm; basal veins 11 to 13(14) pairs, none of them free to the base, 2nd pair and higher order veins

coalesced into a straight posterior rib with the basal veins regularly branching off, 5 to 6 of the basal veins acroscopic, 7 to 8 of them basisopic; midrib sunken and slightly paler above; sinus 11–20 cm deep, miter-shaped; major veins round-raised and slightly paler below, drying slightly paler on both surfaces; primary lateral veins 5 to 8 pairs, arising at 45°–70° angle, sunken and concolorous above, round-raised, slightly paler and weakly striate below; tertiary veins weakly sunken above, prominently raised below; all major and minor veins prominently puberulous on lower surface, the pubescence of the midrib most dense along the lower margin near the surface of the blades, forming a fringe; collective veins usually 2.3–10 mm from the margins. INFLORESCENCES erect, 5 to 6 per axil; peduncle 16–24 cm long, obtusely triangular, flattened on one side, medium green, matte; spathe 15–21 cm long, matte, the spathe tube 5.5–6.5 cm long, 2.8–3.4 cm diam., medium to dark green outside, sometimes also inside but weakly tinged purple inside at base usually in lines, or purple, the blade 14–16 cm long, 2.0 cm diam., creamy white on both surfaces, matte outside, weakly glossy inside; spadix 17–20 cm long, equal to or slightly longer than the spathe pre-anthesis, the pistillate

portion yellowish, 1.8 cm long in front, 1.2 cm long in back, 1.6 cm diam. at base, 1.2 cm diam. at apex; sterile staminate portion of spadix 2.5 cm long, 1.8 cm diam. at base; constricted portion of spadix 1.1 cm diam.; fertile portion of staminate spadix cream-colored, 1.1 cm diam. midway, 6 mm diam. at 1 cm from apex. Pistils medium to dark green; stigmas greenish yellow. INFRUCTESCENCES to 8 cm long, 5 cm diam.

*Distribution and habitat.* *Xanthosoma puberulum* is endemic to Bolivia, where it is known only from La Paz in the provinces of Nor Yungas, I. Muñecas, and Sur Yungas at 1400–2980 m elevation. It frequently grows along watercourses on steep slopes in partial shade.

The new species is recognized by its arborescent habit with a huge, thick stem partly creeping over the ground, its huge semi-erect leaves with the petioles sheathed to above the middle, and ovate, prominently lobed blades with sunken major veins and its spathe tube medium to dark green inside, weakly tinged purple inside at the base, usually in lines. This latter character and the puberulent veins on the lower blade surfaces are the most important features distinguishing this species. This species is similar to other arborescent species such as *X. undipes* (K. Koch & C. D. Bouché) K. Koch, but that species differs in having the lower blade surface glabrous and the spathe tube dark purple on the inside. *Beck 24546* may represent a juvenile plant of this species; however, it is much less pubescent than more mature plants.

*Paratypes.* BOLIVIA. **La Paz:** Nor Yungas, Unduavi-Caranavi, 34.8 km E of Unduavi, 16.3 km SW of Yolosa, *Croat 51573* (LPB, MO); 13.7 km NW of San Pedro on rd. through Incahuara-Mejillones and along trail to 12 de Oct., *Solomon 9619* (LPB, MO); 17 km SW of Yolosa on rd. to Chuspipata, 13.2 km NE of Chuspipata, *Solomon & Uehling 12259* (LPB, MO); 14.4 km NE of Chuspipata, 15.8 km above Yolosa, *Solomon 8615* (LPB, MO); Yolosa, 15 km toward Chuspipata, *S. Beck 13550* (LPB, MO); Yolosa hacia Chuspipata, pasando Sacramento Bajo y el derumbe grande antiguo, *S. Beck 22477* (LPB); Caranavi-Yucumo, 32.4 km NE of Caranavi, *Croat et al. 84267* (LPB, MO, UB, US); Anmi Cotapata NP, Est. Biól. Tunquini, NW of Coroico, NNE of La Paz, vic. Chairó, 23 km W of Yolosa, *Croat et al. 84770* (LPB, MO); Chulumani-Irupana, ca. km 5, entering toward Apa Apa, *Beck et al. 24782* (LPB, MO); de Chulumani 7 km hacia Irupana, Apa Apa, *S. Beck 24546* (LPB, MO); Tarila, *Hinojosa & Aparicio 520* (LPB); I. Muñecas, Llusta, *Flores 46* (LPB).

***Xanthosoma seidelii*** Croat, sp. nov. TYPE: Bolivia. Santa Cruz: Ichillo, 5 km WSW of El Hon-do, "Potrerillo," W of Quebrada La Concha, 17°40'20"S, 63°28'35"W, 400 m, 13 Feb. 1994, *M. Nee & I. Vargas 44910* (holotype, MO-04639110; isotypes, LPB, NY, USZ). Figure 9B.

Planta terrestris, minus quam 1 m alta; tuber depresso-globosum, 6 cm diam.; petiolus 60–71 cm longus, 18–30 cm vaginatus; lamina ovato-sagittata, 30–40 cm longa, 20–25 cm lata; pedunculus 23 cm longus; spatha 13.5–19 cm longa, tubus 5.5–7.5 cm longus, atropurpureus intus.

Terrestrial, medium-sized herb to less than 1 m tall; tuber depressed-globose, those seen less than 6 cm diam., densely rooted. *Petioles* 60–71 cm long, subterete, drying greenish brown, finely striate, sheathed 18–30 cm at base, ca. 40% its length; sheath acute at apex. Leaf *blades* ovate-sagittate, 30–40 × 20–25 cm, drying very thin, dark brown to dark olive-green and matte above, moderately glossy and grayish yellow-green below; posterior lobes 11–14 cm long, 7–11.5 cm wide, rounded to narrowly rounded at apex; sinus 7–12 cm deep, ± hippocrepiform; basal veins 4 to 5 pairs, the first free to the base or nearly so, the remainder variously coalesced into a straight posterior rib that extends straight to the apex; the posterior rib not at all naked; *primary lateral veins* 4 pairs, arising at an acute angle then spreading at 40°–50° angle, nearly straight to marginal collective veins; minor veins thin, moderately distinct but not at all raised on drying. INFLORESCENCES with *peduncle* to 23 cm long, drying dark brown, 5 mm diam.; *spathe* 13.5–19 cm long; spathe tube 5.5–7.5 cm long, green to purplish on outside, dark purple on inner surface; spathe blade 10 cm long, creamy white on both surfaces; *spadix* slightly shorter than spathe; pistillate portion to 2.7 cm long in front, 1.9 cm long on back, drying 7–8 mm diam., narrowed toward apex (color not reported but drying grayish lavender with fine dark purple longitudinal stripes throughout its length, the stigma drying dark brown to purplish, 1.0–1.2 mm diam.); sterile staminate portion 3.5 cm long, ca. 2.0 cm diam., the lowermost row of flowers 3–4 mm long, 1–2 mm wide; the other flowers about as broad but much longer, 7–9 mm long, fertile staminate portion not seen.

*Distribution and habitat.* *Xanthosoma seidelii* is apparently endemic to Bolivia, where it is known in La Paz and Santa Cruz at 400–1400 m.

The new species is characterized by its medium size, subglobose tubers, ovate-sagittate blades that lack a naked posterior rib and dry moderately glossy on the lower surface, and purple inner spathe tube and pistils that dry with fine purplish lines on the ovary.

The new species is most similar to *X. sagittifolium* K. Koch, which also has leaf blades lacking naked posterior lobes, but differs in its moderately glossy (rather than matte and bluish green) lower

blade surface, and purple (rather than green) inner spathe tube surface.

A juvenile collection (*M. Moraes & E. Oviedo 2025*) from Beni in Yacuma may also be this species. Its blades differ in being proportionately narrower with posterior lobes narrowed to a blunt point.

The species is named in honor of German botanist R. Seidel, who along with E. Richter collected the species for the first time in 1988.

*Paratype.* BOLIVIA. **La Paz:** Nor Yungas: Río Unduavi valley, Santa Rosa–Machacamarca, above Lamina San Silvestre, *R. Seidel & E. Richter 1198* (LPB, MO).

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